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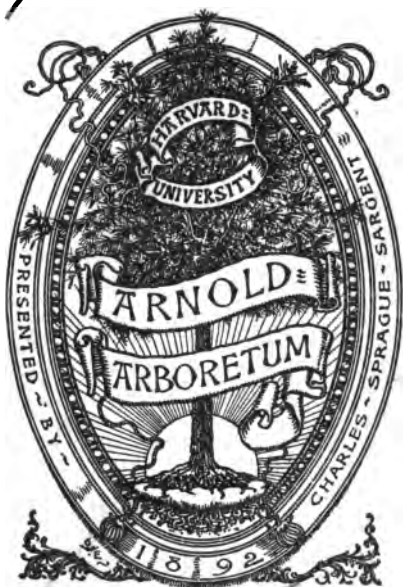
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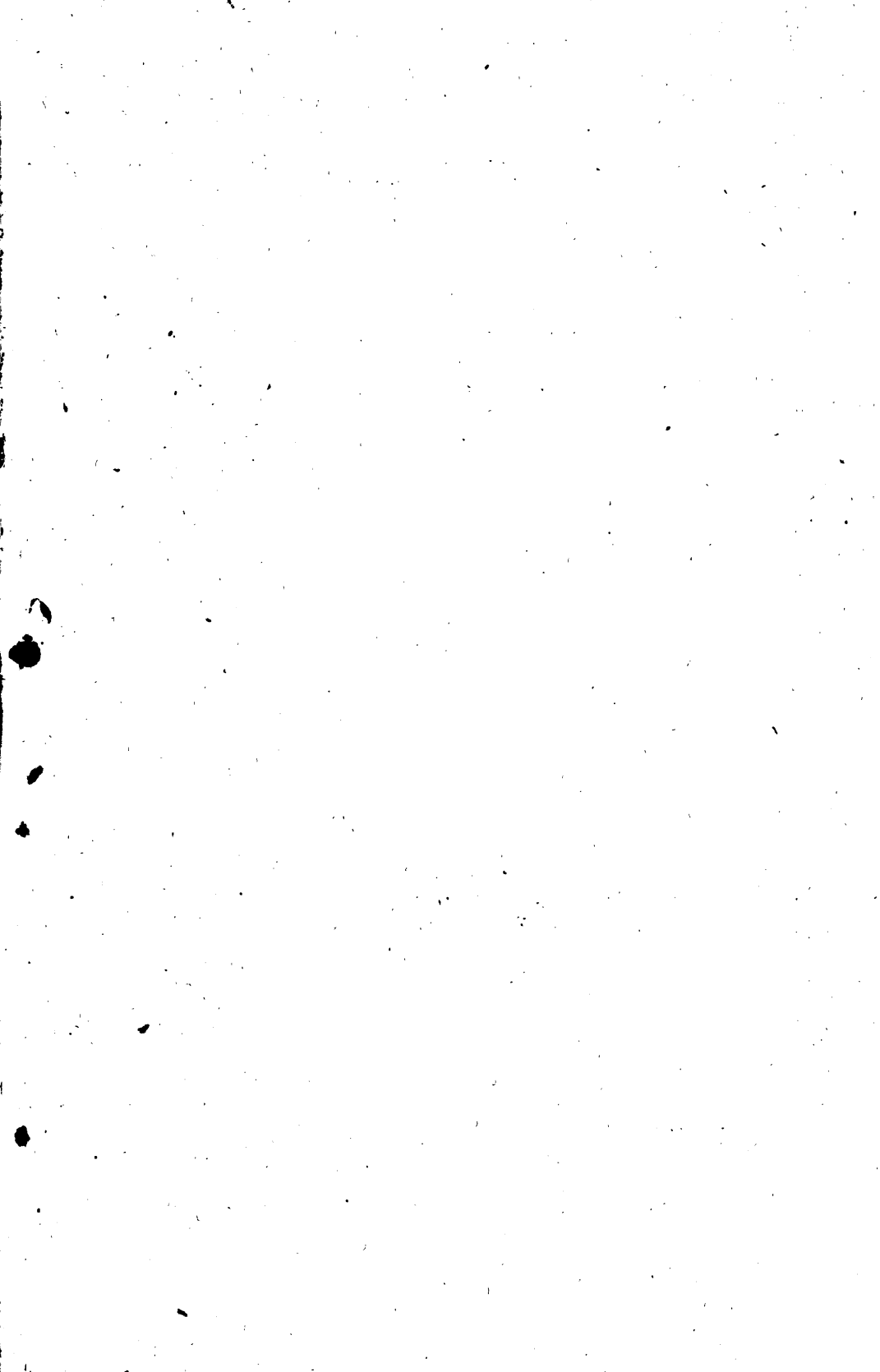
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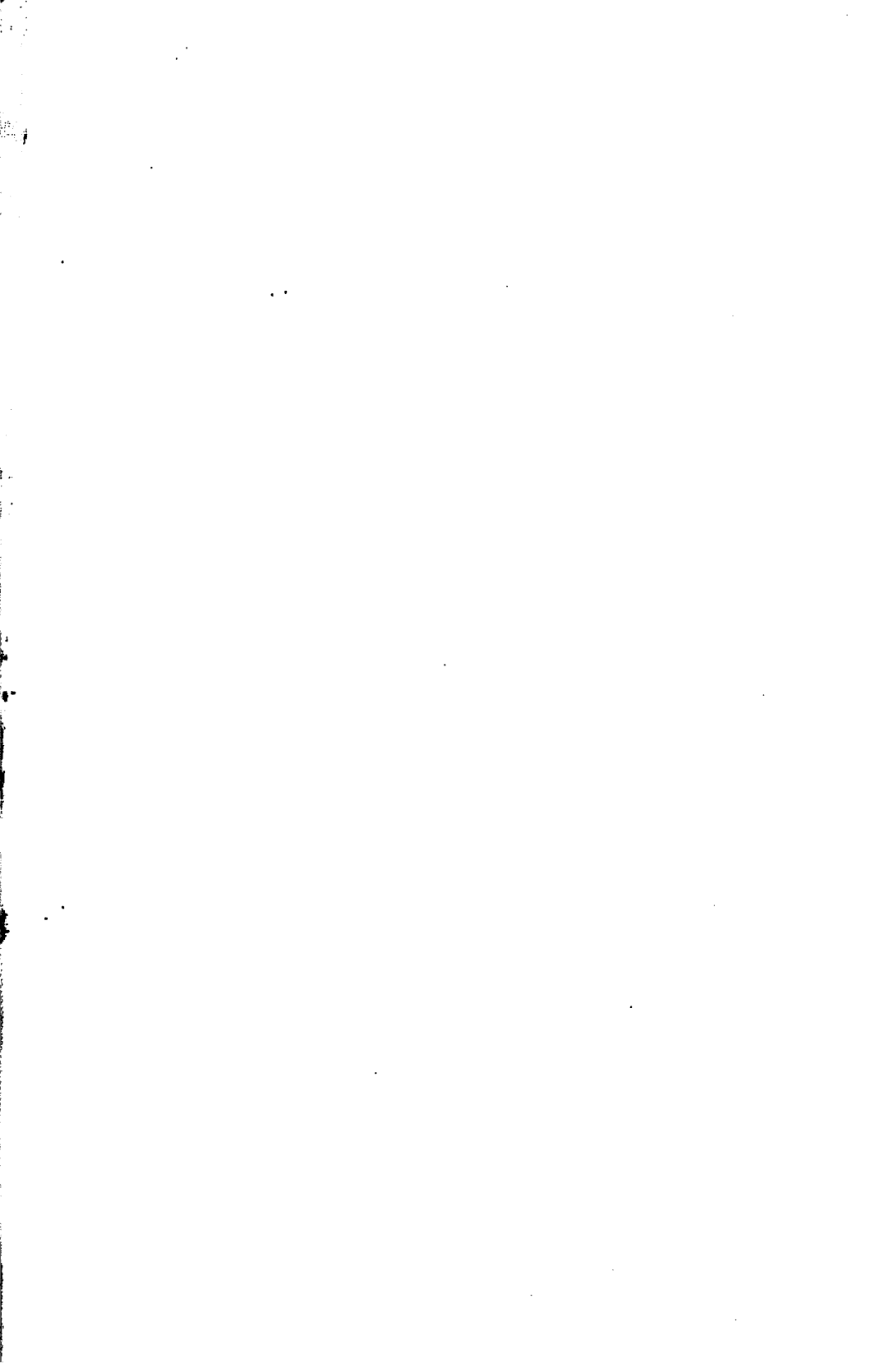


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*The*  
**Hawaiian Forester**  
AND  
**Agriculturist**

ISSUED UNDER THE DIRECTION OF THE  
**Board of Commissioners of Agriculture and Forestry**  
TERRITORY OF HAWAII

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**VOLUME 12—NUMBERS 1 TO 12 INCLUSIVELY**

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EDITOR  
**DANIEL LOGAN**

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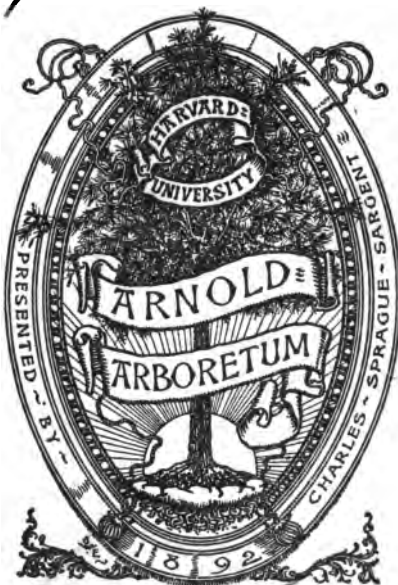
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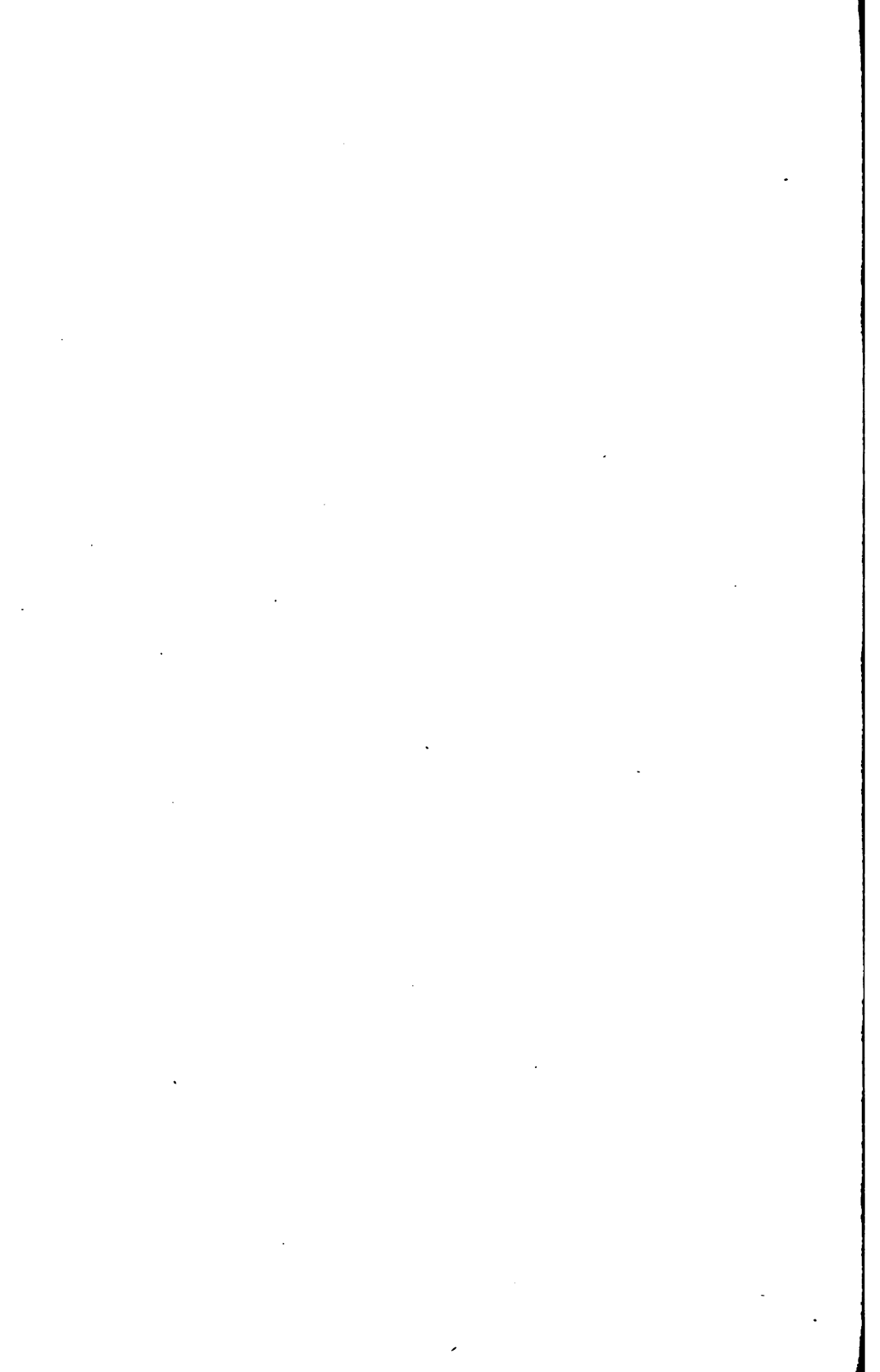
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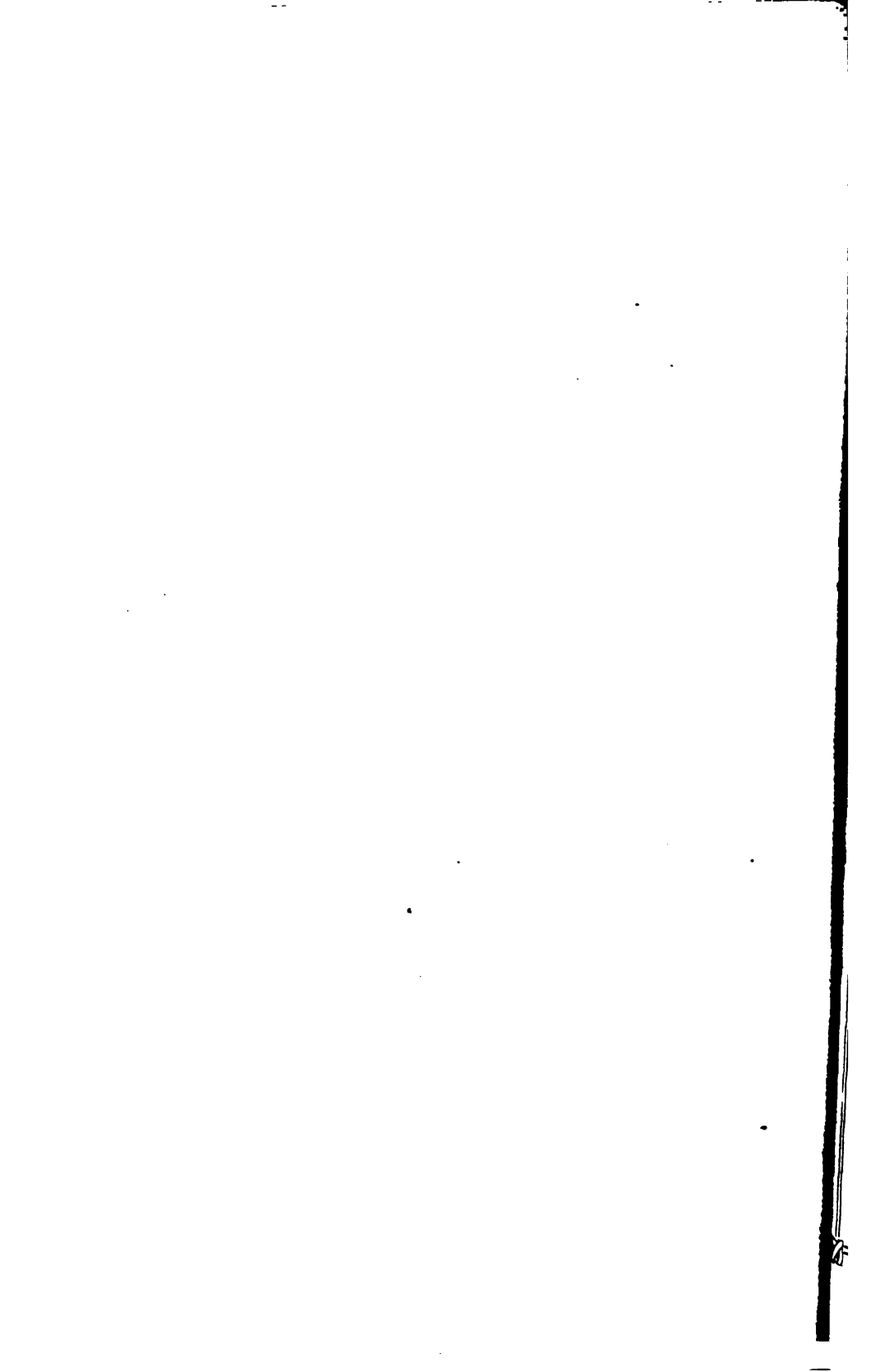
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*Patterson*  
*at the Honolulu office*

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JANUARY, 1915

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— THE —

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AND

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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

**DAVID HAUGHS,**

Acting Superintendent of Forestry.

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### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 2 HONOLULU, HAWAII.

**EDW. M. EHRHORN,**  
Superintendent

# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. XII.

JANUARY, 1914.

No. 1

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## *NEW PRESIDENT OF BOARD.*

Mr. Albert Waterhouse has succeeded Mr. W. M. Giffard as President of the Board of Agriculture and Forestry. He has been one of the most active members of the Board for several years past. Mr. Giffard remains a member of the Board of Commissioners.

## *NEW FORESTRY SUPERINTENDENT.*

Mr. C. S. Judd assumed office as Superintendent of Forestry, in succession to Mr. Ralph S. Hosmer, now head of Yale Forest School, early in January. He is also the executive officer of the Board of Agriculture and Forestry. Mr. Judd has had years of experience in the Federal forest service, besides a short term in special forest work in Hawaii between separate engagements on the mainland, and being of Honolulu birth and early education his appointment as head of the Division of Forestry was received with special gratification.

## *MUNICIPAL MILK INSPECTION.*

Mayor Lane, the board of supervisors approving, has declined to cooperate with the board of agriculture and forestry in the work of milk inspection. He has appointed his brother as inspector, instead of Mr. Richard, who has been in the employ of the board of agriculture and forestry since his removal of the former mayor from the position. The mayor has promised that he will see that the inspection is thorough. On the other hand, Dr. Wayson, city and county physician, has taken ground in a published interview—if correctly quoted—that a municipal dairy inspector has nothing to do with the inspection of milk but only of dairies. Further, he is reported as saying that the inspector is not required to have any technical training, also that the office has existed since 1911. Surely the city and county physician had never taken the trouble to read,

much less study, the milk ordinance before giving expression to such views. Taking his last mentioned statement first, the fact is that there has been a municipal milk inspector since March 21, 1910, the date of the approval of the milk ordinance by the mayor.

There are ten conditions prescribed in the ordinance for the receiving and holding of permits to sell milk, the breach of any of which renders the licensee liable to forfeiture of his permit. Six of these conditions relate to the quality of the milk and four to the sanitary production thereof. Full authority is given to the city and county physician, the inspector and "any other duly authorized officers of the city and county" to take samples of milk offered for sale, with the obvious intent that such samples may be examined to ascertain whether, in the words of the ordinance, the "milk shall be deemed to be impure, adulterated, unhealthful and unwholesome." Now, as matter of fact, the first two milk inspectors serving under the city and county—Mr. Myhre and Mr. Richard—had technical training in the simpler processes of examining milk as to its purity, and this is one of the reasons why the board of agriculture and forestry desired the reappointment of Mr. Richard by the municipal authorities.

What renders the reported statements of the city and county physician the more extraordinary is the fact that he is the supreme authority over milk inspection under the ordinance. If he assumes his functions in this regard to the full extent, hope that milk inspection on the part of the city and county will cease to be a misnomer may be entertained.

While it is true that the milk ordinance is defective, although probably the best enactment that could have been made at the time of its adoption, statements that have been made to the effect that it does not contain provisions for its enforcement are scarcely justified. Under its provision for annual registration of licenses to sell milk, dairymen who do not comply with the conditions prescribed for ensuring a pure and honest milk supply may be deprived of their permits. This deprivation need not, indeed, await the period of annual registration, for the ordinance requires weekly reports from the inspector to the physician. In other words, the city and county physician has powers in the ordinance of which he does not appear to have dreamed.

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Dr. Nørgaard's appreciative comments on the Hawaii County Fair and his suggestions regarding future events of the kind, either in Hawaii or other counties, are worthy of study by all homesteaders, raisers of livestock (including poultry) and dairymen throughout the islands. These classes of producers are happily becoming of such numerical strength as to give them a potent voice in dictating to the constituted authorities measures

that may be necessary to place general agricultural industry upon a proper footing in the Territory.

---

It will be only a few years, according to the report of the forest nurseryman in this number, when the various military posts on this island will have a parklike aspect which will make them a joy not only to the nation's defenders inhabiting them but to civilian residents of Honolulu and visitors from the outside world.

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Since last month's number was issued word has been received that J. C. Bridwell, assistant territorial entomologist, left Lagos, Africa, for Durban on November 1, and intended returning home by way of Australia.

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An important intimation in the report of the veterinarian for November is that the hog-raising industry, lately severely checked by hog cholera, is again coming into its own.

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It is gratifying to note the progress reported by the Division of Animal Industry in the extension of bovine tuberculosis control to the islands other than Oahu.

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Glenwood is one of the few places in these islands bearing a foreign name, but nevertheless its modern dairying enterprise promises to make it famous.

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Fruit fly control by the natural method continues to have favorable reports of it from the entomologists in charge.

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Arbor Day statistics of the latest celebration are no less gratifying than those of previous occasions.

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## DIVISION OF ANIMAL INDUSTRY.

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Honolulu, Nov. 30, 1914.

The President and Members of the Board of Agriculture and Forestry:

Gentlemen.—I beg to report on the work of the Division of Animal Industry for the month of November, 1914, as follows:

TWENTY-THIRD ANNUAL MEETING, MEDICAL SOCIETY OF HAWAII.

On November 21st I had the honor to address, by invitation, the Medical Society of Hawaii on the subject of "Bovine Tuberculosis and Its Relation to Public Health," with special reference to that of children under five years of age. As a copy of my paper on this subject was submitted to you before it was read before the Association, you will know that its

special aim was to enlist the assistance of the medical profession of the Territory (not in Honolulu alone) in getting the milk consumer, and especially the one who provides milk for infants and children, to know and appreciate clean milk, and to demand that the milk producer, that is, the dairyman, furnish clean milk from healthy cows. Renovated or purified milk does not fill this bill, though it is better than filthy milk, but soluble impurities cannot be strained out of milk by mechanical processes, nor can milk containing the remains of one million micro-organisms in every single drop of its volume be considered clean and wholesome, just because the bacteria have been killed, or their vitiating activities retarded by either chemical or physical methods.

Immense progress has already been made towards that much desired goal—clean milk from healthy cows—especially so far as the latter part is concerned; but as regards the first part there is still very much to be accomplished. For this little Territory, however, it may be justly claimed that there is probably not a single milk producing district or community in the world that could lay claim to entrance into the same class, when the health of the dairy cows is being considered. Few if any of the devastating scourges of the dairy barns of the States or the European countries are known here. Diseases of the udder are comparatively rare, cowpox extremely so, infectious abortion is hardly known by name here, though it decimates the stables and annihilates the profits of the dairy-men in many countries; pneumonia, bronchitis and parturient apoplexy claim thousands of victims annually, in the United States as well as in Europe, to which losses may be added the cost of simply keeping the animals warm during four to eight months out of every year, and the diseases inherent upon that requirement. Then there is apthous fever, commonly called foot and mouth disease, and which at the present time has not less than sixteen of the States tied up in rigid quarantine, with both local and interstate traffic in dairy cows and their products absolutely paralyzed. And, finally, there is bovine tuberculosis, the one disease of live stock of which we have certainly had our share and which, more than all the rest combined, has required and is requiring the full attention and best efforts of the medical and veterinary sanitarians, here as everywhere else in the civilized world, where its influence on human health and happiness and its economic import on the live stock industry have become recognized. The now unquestioned transmissibility of bovine tuberculosis to human beings, the universal spread of the disease and its insidious course render the closest co-operation between the medical and the veterinary profession imperative, if noticeable inroads are to be made toward its control and suppression; and, while much has already been accomplished here by the two professions work-



ing separately though towards the same end, it is fully expected that greater progress can be made in shorter time and at less cost now that such co-operation has been assured. Briefly, the campaign will be one of education, first, as already stated, by awakening the interest of the milk consumer in the actual source of his daily milk supply. This in itself would accomplish much, as many a milk consumer would abandon the use of milk entirely were he to visit the premises where some of the milk that is offered the Honolulu people is produced, or else he would hunt for a safer source of supply and periodically, at least, satisfy himself of its continued sanitary condition.

That the medical profession of Honolulu were not unaware of the unsatisfactory state of the local milk supply was plainly voiced by a number of both practising physicians and sanitary officials, at the meeting in question; in fact the subject proved one of absorbing interest and brought to light very strange incidents encountered by the practitioners with reference to milk furnished their patients, but which I shall not repeat here, for fear of straining the faith of the milk consuming public to the bursting point. As long as practically all infants less than one year old and at least 75 per cent of all children between one and five years must have cow's milk daily, or else either die or become stunted in their development, nothing can be gained by destroying the faith of the parents in the one substitute for mother's milk and the only nearly perfect food for children and invalids, until something better or equally good can be offered in its place. But much can be gained by destroying or reducing the criminal carelessness with which the general public accepts milk as milk, that is, as the only proper food for their children. To this end the full support of the medical profession was cheerfully granted, the support being voiced by the president and members of the Territorial Board of Health, of the Anti-Tuberculosis League and by the practising physicians through the presiding officer of the Medical Association.

By constantly bringing to the attention of the milk consumer the importance of clean milk from healthy cows the visiting physician, in families with children especially, will be instrumental in creating a corps of voluntary milk and dairy inspectors, men, women and children, who will read with interest such short notes and easily comprehend facts and figures pertaining to milk, milking methods and utensils, cows, their keep, care and characteristics, how to tell a tested from an untested cow, and which, it is expected, will appear periodically in the daily or weekly publications throughout the Territory, under an easily recognized pictorial heading, that of a good type of milk cow for instance. The progressive dairyman or milk producer will undoubtedly welcome all such visitors to his premises who come to seek information about his means

and methods of milk production, and will endeavor to keep his stables, milk room and animals as neat and clean as possible, keeping in mind the fact that his visitors may have drunk or will drink, that same day, some of the milk produced on his premises. Such visitors or volunteer inspectors should of course refrain from unkind remarks or untimely criticism. It is their privilege to change milkmen, if they so desire, and also to report any shortcomings observed by them to the proper sanitary officer for investigation. The ultimate aim of this novel form of dairy inspection is to create a crisp but friendly competition in the dairy industry which will be of benefit to the producer as well as to the consumer, as it will demonstrate in the most unmistakable manner that clean milk cannot be produced at the same price as filthy milk and that the consumer who wishes clean milk from healthy cows must expect to pay for it.

While it may seem an unnecessary remark I wish to state, in conclusion, that the above outlined plan in no way is supposed to take the place of the official milk inspection, to which the community is entitled and for which it has paid, but which has been dormant now for nearly two years. Until this important office is placed in competent hands it is obvious that much of the benefit expected from the auxiliary inspection will be lost.

#### FIRST ANNUAL HAWAII COUNTY FAIR.

From November 26th to 28th inclusive there was held at Hilo the first county fair ever held in the Islands. A great deal of credit is due the enterprising citizens of Hilo for this their first attempt at introducing here an oldtime, truly American institution, which admittedly has done much to speed agricultural progress over the western plains. While a territorial live stock association has been in existence for a number of years no real live stock show has ever materialized here. Handicapped by the sugar industry as the actual agricultural pursuits have always been in these islands, the so-called "small farmer" needed some fresh blood from the middle and western "West" of the United States, where the annual state or county fair still pursues its alfalfa, corn and pumpkin garnished way of victory, scattering encouragement, silver cups and many colored ribbons in its trail, to show the agriculturists of the Big Island "how to do it," and such a man was evidently found in Mr. F. A. Clowes, director of the federal experiment station's branch at Glenwood, Hawaii. Surely, nobody who had not witnessed such a County Fair, not once, but a number of times, could have rendered so close an imitation of a real middle-west county fair as did Mr. Clowes with his Hilo fair, granting due allowance for the local coloring. For surely no

middle western fair ever exhibited stalks of sugar cane weighing nearly sixty pounds apiece and measuring eighteen feet in length, or bunches of bananas that would be worth two and one-half dollars apiece if they retailed at one cent per banana; nor did any of the States in the Union ever show such a variety of fruits and vegetables, from the most tropical species as citrus, lemons and mangoes to those requiring the cold crisp air of the northern latitudes as celery, strawberries and pears, all raised within a few miles of each other, but at different altitudes—on the slopes of the sky-scraping volcanoes of the Island of Hawaii.

But as my business at the fair was in the capacity of judge of live stock it is but fitting that that branch of the show be given primary consideration here even though it were better not to do so. In extenuation of that statement it must be said that the elements had conspired to make a live stock show impossible, unless some water and weather-proof premises were available for its accommodation. The rains were simply torrential, at least to the visitors from milder climes, and while many live stock owners were there—drippingly—they could hardly be blamed for not bringing their best animals, even though they risked bringing their families. And by the same token, prizes in the form of silver cups, medals and ribbons were plentifully provided for dairy cattle, while not a single entry class even was provided for beef cattle, the second-to-sugar-cane largest industry on the island. Dairy cattle seemed to be the one item, so far as live stock was concerned, that the committee in question seemed to consider worth while encouraging, unless poultry is live stock. Although the promotion of the live stock section had been placed in the hands of my good friend and colleague, Dr. Elliot, whose ability and earnestness nobody can question, the entire idea of a competitive exhibition of live stock was so new and unlooked-for that few if any of the dairy people and live stock raisers in the district realized its meaning or had time to learn how to prepare for it. But to conclude from this that the show was a failure or that nothing was gained by it would be a grave mistake. Far from it. Every one of the exhibitors went home telling himself, "Wait till next year and I'll show you," and that is exactly what a county fair is for. Now the spirit of competition has been awakened, nothing can hold the exhibitors back, and next year's show which is planned for a more favorable climatic season, July 4th, will require premises ten times the size of the entire show just closed, in order to accommodate the live stock section only.

It is unnecessary here to go into any details in regard to the animals exhibited, beyond a word to those who carried home the silver cups; and that is to remind them that these cups have to be won three times in order to become the property of

the present winners, and that competition will be more strenuous next summer, and vastly more so in 1916. If therefore this year's winners enjoy seeing the silver cups on the sideboard they will have to go to work immediately to keep it there, for those who did not carry home a cup or a medal, or even a ribbon, this time, have already made up their minds that they are going to do so next time; and it may be well for all to remember that it takes more than a week, or a month, to put an animal in blue ribbon condition, and that entry regulations will probably be far more strenuous in the future. Also that milk cows or dairy stock in general cannot be judged as to merit and value simply by their appearance, that it is their performances as milk and butter-fat producers that count, and that breeding is quite as important as conformation. Consequently future exhibits must be accompanied by either pedigrees or performance records and such anomalies as brindle Jersey bulls are not likely to be admitted, unless exhibited as freaks. That the Hilo county fair has caused a great deal more interest than would appear from the press, which for instance entirely omitted mention of the almost preponderating, if not the most important section, the poultry exhibit, cannot be doubted. Those on the Big Island who did not exhibit, and who, on account of poor means of transportation, could not exhibit, except at exorbitant cost, are possibly inclined to favor a territorial exhibition, at the expense of the county one. That is right in one way only. A territorial exposition every two or three years, to be held in Honolulu, for all of the counties to partake in would be great, but for the benefit of the great majority, who can neither afford to visit nor to exhibit at such a central affair except occasionally, the county fair as inaugurated by the recent Hilo effort is the one thing which can be appreciated and participated in by everybody. Hawaii for instance is a big island and while it might be easier, under present conditions, for certain sections—Kohala and Waimea for instance—to exhibit in Honolulu than in Hilo, still there will always remain the natural pride of the inhabitants in their own island, and therefore they should have their county fair, and transportation accommodations for themselves and their exhibits should be forthcoming, and undoubtedly will. The county fair has built miniature empires everywhere, and the ambulatory state fair has put its crown-glory on each in turn, amalgamating the state interests and spirit and putting zest and good-will into the competition for supremacy among the counties. While a county fair may be held once a year in each county and under proper management be made to pay for itself, a territorial fair held every third year for instance must be subsidized. But without such public exhibitions of individual endeavors and accomplishments much valuable time will be lost in bringing the various agri-

cultural, horticultural and animal husbandry pursuits up to the highest point. It is therefore to be hoped that the example set by the Island of Hawaii will soon be followed by the other counties and will result in a territorial organization and fair for the promotion of that spirit of endeavor and competition, the absence of which has characterized the agricultural pursuits in the Territory for the past many years.

#### BOVINE TUBERCULOSIS CONTROL WORK.

While the general tuberculin test has been finished, showing an aggregate of about 7000 tests for the year (as compared to 4500 for last year) with a reduction in the number of reactors of more than one per cent, it is not the intention here to discuss this subject but to call especial attention to the necessity of the extension of this most important class of work to the other islands. My visit to Hilo has fully convinced me that now is the time to begin in earnest in that section, the testing hitherto done having been more of a preliminary nature, to ascertain the probable prevalence of the disease as well as to familiarize the milk producers with the necessity of eradicating the disease, and the benefits to be derived therefrom. In this work Dr. Elliot has been ably assisted by the local Board of Health officials, a sanitary inspector having been assigned especially to the milk and dairy inspection work. This inspector accompanies Dr. Elliot whenever there is testing to be done, while the caretaker of the quarantine station is assigned the work, whenever possible, of notifying the cattle owners a day or two ahead of the arrival of the inspectors to insure that the animals are kept in for the test. For anyone familiar with the nature of the country around Glenwood, where the principal dairy section is located, it is easily understood that, when the cows have once left the dairy after being milked in the morning, it is almost impossible to bring them back again until they return at their own volition toward evening. In the same way it is extremely difficult to gather in the young stock for testing, without a regular round-up. When to this is added that the Glenwood district alone is about twenty miles from Hilo and that each test requires at least two visits, the importance of gathering in as many animals as possible becomes evident, as the escape of a single cow or the failure of keeping one or more animals in means, in many cases, an additional one hundred miles of travel, for which no charges can be made. The dairymen now seem willing enough to have their herds tested and even to have the reactors destroyed, but the difficulty of doing it with private transportation, over a district reaching from Laupahoehoe to Hilo and from Hilo to Pahala, and to make the visits fit in with the regular weekly visits to the plantation and other

stables, where Dr. Elliot's principal work is located and which cannot be neglected, has frequently proved next to impossible without sacrificing time and traveling expenses far in excess of what the inspector can afford. If therefore the work is to be at all thorough and effective it must be subsidized by this Board to the extent of at least \$50 per month additional, the present subsidy of \$50 per month being but slight compensation for the time the inspector must give to this work in that immense district. The dairy industry, both milk and butter production, is steadily increasing, especially in the Glenwood district, and few people work harder and under more unfavorable conditions than do the dairy colony in that neighborhood, but the feed is there the year around and the results show that good dairy animals can be raised there and that the immense area is good for nothing else. It would therefore seem but just that the industry be encouraged so far as possible and, it is fully believed, that can best be done by this Board by preventing the further spread of bovine tuberculosis by a subsidy as above suggested.

Another difficulty which is now being overcome was the lack of a central slaughterhouse where branded reactors could be butchered under competent inspection. This is now being remedied by the Board of Health permitting the use of an old slaughterhouse in Hilo for this purpose only, all other slaughtering being done outside the city limits and usually in out of the way places and at considerable distances where it has been impossible for Dr. Elliot to attend to the inspection without which the use of the meat from reactors should not be countenanced.

That the tuberculosis work on Maui is evidenced by a request just received from Dr. Fitzgerald for an additional 2000 ear tags, the Grove Ranch having decided to have all their cattle tested and tagged. This step is probably to ascertain if the disease has extended out among the beef cattle, and if so to stop it in its incipency after which the testing of the female stock only will be necessary.

#### IMPORTATION OF SHEEP FROM NEW ZEALAND.

A shipment of fifty purebred Merino rams arrived from New Zealand via Sydney and consigned to the Parker Ranch a short time ago. The animals, which are now at the quarantine station where they have been submitted to disinfecting baths as required by the federal authorities, are splendid specimens and will undoubtedly do much to improve and increase the already well-known Humuula wool clip. This shipment was further augmented by the arrival of ten purebred Shropshire rams and fifty-eight purebred Delaine Merino rams from Oregon, all likewise consigned to the Parker Ranch.

## PROSPECTS OF INCREASED HOG RAISING.

The losses throughout the Territory from hog cholera which have necessitated the importation during the past year of a considerable number of butcher hogs seem now to have abated sufficiently to allow of a revival of the hog industry on a hitherto unknown scale. An importation of several hundred purebred brood sows of various breeds, but principally Berkshires, Poland Chinas and Duroc Jerseys will arrive here shortly. It is the intention of the enterprising importer to utilize the rich mess offal (swill) which daily accumulates at the military barracks on this island, and especially at Schofield, in immense quantities; as the principal feed, and a splendid location has been selected for the erection of an up-to-date sanitary piggery which is now under construction. Every precaution known to science will be taken to guard these valuable animals against hog cholera or any other infection as well as for the speedy application of the serum treatment in case the disease should find its way to them.

If successful the enterprise will undoubtedly prove a very remunerative one, especially while the hog prices remain where they now are, and it seems safe to predict that next year will see few if any butcher hogs imported from the mainland.

## BIENNIAL REPORT.

The report of this division for the years 1913-1914 is now under preparation and will require all the time which can be spared from the routine work of the division.

A separate letter containing the estimates for improvements at the quarantine station is herewith appended.

Very respectfully,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

## REPORT OF ASSISTANT VETERINARIAN.

Honolulu, November 30, 1914.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of November, 1914:

*Tuberculosis Control.*

The following dairy cattle were tested during the past month:

	T.	P.	C.
O. R. & L. Ranch at Kahuku.....	357	357	0
do do .....	234	233	1
do Malaekahaua....	309	302	7
Waialae Ranch (tested by Norgaard)	69	58	11
T. H. Cummings.....	1	1	0
John do Moral.....	7	7	0
Shimada . .....	8	8	0

The above tabulated list gives a total of 985 head tested out of which 966 head were passed and tagged and 19 head condemned and branded.

The following post mortem examinations were made.

No. 1. A two-year-old heifer condemned Oct. 30 at the Pond Ranch, Mokuleia. Lesions: Small nodules in the retro-pharyngeal glands. There were no other evidences of disease.

No. 2. Grade cow condemned November 13th by Dr. Norgaard at Waialae Ranch. Lesions: Two mediastinal glands diseased, one of which was greatly enlarged and filled with caseous tuberculous material; one small nodule in the diaphragmatic lobe of the right lung. No other lesions.

No. 3. Jersey bull two and a half years old brought from the Coast by A. L. MacPherson June 17, 1914. The animal was in very poor physical condition, being extremely emaciated; there was no appetite; the breathing was accelerated and labored; there was an occasional cough. Auscultation of the chest cavity revealed tinkling metallic sounds indicative of traumatic pericarditis. The animal was first subjected to the intradermal tuberculin test to which it gave no reaction. After consultation with the owner it was decided to kill the bull and make post mortem examination. This examination revealed the following condition: Purulent pericarditis; lungs showed several pneumonic areas, both diaphragmatic lobes were firmly attached to the diaphragm and the azygous lobe was firmly attached to the pericardium. The pericardium was enormously distended and thickened to a quarter of an inch and contained about a liter and a half of foul-smelling pus. Several pieces of wire were taken from the reticulum which was itself firmly attached to the diaphragm. The entire carcass was condemned as unfit for human consumption because of the extreme emaciation and peculiar odor of the flesh.

#### *Importations of Live Stock.*

Sonoma, San Francisco: 1 crate turkeys, Wm. Knight.

Manoa, San Francisco: 2 dogs, W. F. X. Company; 16 crates poultry.

Chiyo Maru, Orient: 1 crate Japanese games; 2 Japanese Spaniels, P. Ryan.



Matsonia, San Francisco: 18 crates poultry, 2 crates Belgian hares.

Hilonian, Seattle: 2 Holstein heifers, 7 Duroc Jersey hogs, 2 Duroc pigs, H. C. & S. Co., Maui; 1 crate poultry, W. F. X. Company.

Kentuckian, Seattle: 8 horses, 5 mules, 7 cows, 2 calves, 318 butcher hogs, 12 hogs for breeding (Hampshires), A. L. MacPherson.

Sierra, San Francisco: 1 crate white Leghorns, J. Forgety.

Lurline, San Francisco: 16 crates poultry, 2 Jersey heifers, J. P. Mendonca.

Wilhelmina, San Francisco: 36 crates poultry.

Ventura, San Francisco: 1 dog, Mrs. McShane.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

#### DIVISION OF ENTOMOLOGY.

Honolulu, November 30, 1914.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of November, 1914, as follows:

During the month 39 vessels arrived at the port of Honolulu of which 22 vessels carried vegetable matter.

Disposal.	Lots.	Parcels.
Passed as free from pests.....	1208	30,740
Fumigated . . . . .	9	123
Burned . . . . .	39	39
Returned . . . . .	4	4
Total inspected.....	1260	30,906

Of these shipments 30,656 packages arrived as freight, 153 packages through the postoffice and 97 packages as baggage of passengers and immigrants.

#### *Rice and Bean Shipments.*

During the month 29,557 bags of rice arrived from Japan, and 82 mats of rice from China, also 5441 bags of beans from Japan which, after careful inspection, were found free from pests and were passed for delivery.

### *Pests Intercepted.*

Thirty-eight packages of fruit and one package of vegetables were found in the baggage of passengers and immigrants from foreign countries. These were seized and destroyed by burning. One package of chestnuts from Kentucky, U. S. A., was found infested with the chestnut weevil (*Balaninus* species); another package of forest seeds from Ceylon was found infested with weevils (*Bruchus* species); both were fumigated with carbon bisulphide before delivery. Two large boxes of ornamental plants arrived from Japan and were fumigated and all soil removed from the roots of the plants. In this soil were found the larvae and pupae of a small weevil said to be quite injurious to pot plants in Japan; some larvae of the *Anomala* were found, also one larva of *Sericea japonica*. All these species are injurious to the roots of various plants.

On November 17th Mr. Muir arrived from Japan with three cages containing parasites of the *Anomala* beetle and Japanese Rose beetle. These were taken to the H. S. P. A. Experiment Station and carefully inspected, and are now in the care of the entomologist of that station.

The Territorial Market asked permission to use our fumigating room on Pier 10 for fumigating various seed shipments before storage and I granted their request. We also fumigated a lot of infested beans and corn for one of the local firms.

### *Beneficial Insects.*

Mr. D. T. Fullaway has been quite successful in breeding the recently introduced parasites and has been able to liberate a number of colonies. During the month 15,775 parasites were liberated which comprised the following species:

For Fruit Fly—African parasite (*Opius humilis*), 1250; Proctotrupid (*Calesus silvestrii*), 700; African Tetrastichus (*Tetrastichus giffardi*), 1050; total, 3000.

For Hornfly, Stable Fly and House Fly—Philippine Spalangia, 5500; Hornfly (*Huscidifurax vorax*), 2600; Philippine Pteromalid, 4000; Chalcid (*Dirhinus giffardii*), 675; total, 12,775.

As the Chalcid has been reared from dung fly pupae in the insectary it was decided to liberate a few of these in a good locality where abundant fly pupae existed and to see later on if we can recover this parasite from such material in the open. Attached hereto is a brief report from Mr. Fullaway.

Brother M. Newell of Hilo reports the arrival of seven steamers, five of which brought vegetable matter consisting of 215 lots and 3191 packages which were passed as free from pests. He also reports the arrival of the Seyo Maru direct from Japan with a cargo of rice, 1950 bags; beans, 188 bags,

and peanuts, 50 bags, which he found free from pests and passed the shipments.

*Inter-Island Inspection.*

During the month of November 60 steamers plying between the Islands were attended to and the following shipments were inspected and passed:

Plants . . . . .	77 packages.
Taro . . . . .	502 bags.
Vegetables . . . . .	15 packages.
<hr/>	
Total passed . . . . .	594 "

The following packages were refused shipment on account of infestation or of having undesirable soil attached to the plants:

Plants . . . . .	21 packages.
Fruits . . . . .	17 "
<hr/>	
Total refused . . . . .	38 "

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

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Honolulu, November 30, 1914.

E. M. Ehrhorn, Superintendent of Entomology.

Dear Sir:—Permit me to report the following operations in the insectary during the past month:

In addition to carrying along the Silvestri parasites and other material we have produced:

2450 individual of *Tetrastichus giffardii*,

93 females and several hundred odd males of *Diachasma fullawayi*.

2 males of the black *Opius*, species undetermined.

1 female and 2 males of a third species of *Opius*, undetermined.

The number of pupae handled to produce *Tetrastichus* was 1967 and allowing fifteen parasites to the pupa—a fair average I think—this would give a parasitism of  $8\frac{1}{4}$  per cent. The number of pupae used to produce the *Opius* was 10,559 and the parasitism is about  $3\frac{1}{3}$  per cent. We were able to liberate also altogether 1050 *Tetrastichus* as follows:

Nuuanu Valley, McLean's place, 300 under kamani trees;  
Gartley's place, 300 under scrub guava.

Manoa Valley, Cooper's place, 450 among fallen oranges.

Very truly yours,

D. T. FULLAWAY.

### DIVISION OF FORESTRY:

Honolulu, November 30, 1914.

Albert Waterhouse, Esquire,  
Acting President and Executive Officer,  
Board of Agriculture and Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of November, 1914:

#### *Nursery.*

##### Distribution of Plants.

	In Seed boxes.	In boxes trans- planted.	Pot grown.	Total.
Sold . . . . .	....	....	50	50
Gratis . . . . .	....	....	911	911
Sent to Koolau Forest Reserve, Maui . . . . .	....	2200	....	2200
Sent to Waihou Spring For. Reserve, Maui. 1250	1250	1250	....	2500
Total . . . . .	1250	3450	961	5661

#### *Collections.*

Collections on account of plants sold amounted to . . . . .	\$ .75
Rent of building, nursery grounds . . . . .	35.00
Total . . . . .	\$35.75

#### Plantation Companies and other Corporations.

The distribution of plants under this heading amounted to 38,000 seedlings of Eucalyptus and Ironwood.

*Makiki Station.*

The work at this station, also at the nursery on King street, has been principally in connection with Arbor Day. The packing and sending out of trees for Arbor Day planting required all of the men at both places for about two weeks. A special Arbor Day report on the distribution of trees, etc., has been submitted. As our stock is now considerably reduced we will require to spend most of our time in propagating and transplanting for the next two or three months.

*Honolulu Watershed Planting.*

During the month 837 koa and 576 kukui trees were planted. The trees previously planted are doing very well. The weather has been favorable for tree planting for the past two months, consequently we have been able to plant the trees just as soon as the holes were ready for them.

*Tree Planting on Forest Reserves.*

We have sent to Mr. W. A. Anderson at Nahiku, 2200 Eucalyptus robusta trees in transplant boxes to be planted along the makai boundary line of the Koolau forest reserve at Nahiku, Maui. To Mr. von Tempsky we have forwarded 1250 Grevillea robusta trees in seed boxes and 1250 Cryptomeria Japonica in transplant boxes to be planted on the Wailou Spring forest reserve near Olinda, Maui.

Mr. George R. Carter, who controls a piece of government land at the top of Manoa Valley, has planted 500 trees of various kinds.

At Molooa forest reserve, Anahola, Kauai, Mr. Kaina D. Lovell, who has charge of the planting, reports that the plum seeds are sprouting nicely and already from 2000 to 3000 are showing above ground.

*Seed Exchanges.*

We have received from the director of the Botanic Gardens, Paradeniya, Ceylon, a package of seed containing 13 packets of seed, some of which we have not tried before.

From Mr. William Harris, superintendent of public gardens, Kingston, Jamaica, we received two packages of seed of Juniperus australis, the juniper cedar of Jamaica. This juniper is closely allied to the species of which Mr. Gerritt Wilder sent us seed and which promises to be one of the most valuable introductions we have had for many years. The trees are doing exceedingly well on different parts of the islands where they have been planted. Mr. Harris, in his letter, describes the

juniperus cedar as follows, in part: "I now have pleasure in sending you two bags of seed of Juniperus cedar of Jamaica. It yields a beautiful timber which is used for furniture, cabinet work, interior ornamental house work, etc. It grows in the mountains from 3000 to 6000 feet altitude." The seed sent is germinating nicely and we will have a large number of trees providing nothing unforeseen happens."

*Advice and Assistance.*

The writer has, at the request of various people, paid the following number of visits and answered questions by letter and telephone: Visits to places in and around the city, 10; persons asking for advice by telephone, 9; persons asking for advice at nursery, 16; persons asking for advice by letter, 4.

Very respectfully,

DAVID HAUGHS,  
Acting Supt. of Forestry and Forest Nurseryman.

ARBOR DAY.

Honolulu, November 30, 1914.

Albert Waterhouse, Esq.,  
Acting President and Executive Officer,  
Board of Agriculture and Forestry.

Dear Sir:—I herewith submit a special report on the distribution of plants for Arbor Day, November 20, 1914:

*Arbor Day.*

The following tables will show that the demand for trees is increasing and that the past Arbor Day, which took place on November 20, will prove to be one of the most successful of any yet held. More people in and around the city are taking an interest in beautifying their homes. Homesteaders who have recently taken up homesteads are particularly interested in trees for wind breaks, boundary lines and for shade and ornaments around their homes.

The new military posts, which when first occupied by the different companies were practically destitute of trees, are now receiving the attention of the officers and men and large numbers of trees are being planted. The officers connected with the different organizations at Schofield Barracks ordered over 4000 pot grown trees for Arbor Day planting. It is gratifying to know that a great deal of interest is now being

taken by the military people at the different posts. Their eager inquiries regarding the planting and care of trees is a guarantee that the trees will get the best of attention.

The applications for trees from people living in and around Honolulu has increased over 100 and the total distribution of pot-grown plants over 3000 since last Arbor Day.

The demand for trees for school grounds has been less this year than for former years. This may be accounted for by the fact that for a number of years we have been sending trees to the schools and the grounds of most of them are now sufficiently stocked and do not require more.

The voluntary aid given by the various newspapers in Honolulu and on the other islands in publishing articles in regard to Arbor Day has greatly helped us in making the day a success. We wish to take this opportunity to convey our thanks to all of the newspapers which kindly published articles and in other ways assisted us in notifying the general public of our object.

*Distribution by Islands.*

Oahu—	Applications.	Trees.
Oahu outside of Honolulu.....	21	526
“ Schofield Barracks .....	..	4,062
“ Honolulu and neighborhood..	346	8,305
	<hr/> 367	<hr/> 12,893
School Children on Arbor Day (1 tree each).....	650	650
	<hr/> 1,017	<hr/> 13,543
Total for Oahu.....		
Hawaii . . . . .	24	925
Kauai . . . . .	17	1,870
Maui . . . . .	51	1,334
Molokai . . . . .	2	106
	<hr/> 94	<hr/> 4,235
Schools—		
Outside of Honolulu (Oahu).....	4	63
Honolulu . . . . .	7	109
Hawaii . . . . .	2	63
Kauai . . . . .	4	171
Maui . . . . .	4	311
	<hr/> 21	<hr/> 717

## Summary of Plants Distributed.

	Plants.
Island of Oahu, including Honolulu.....	13,543
“ “ Hawaii . . . . .	925
“ “ Kauai . . . . .	1,070
“ “ Maui . . . . .	1,334
“ “ Molokai . . . . .	106
Schools on all Islands.....	717
Grand total . . . . .	17,675

In addition to the above about 5000 seedlings in seed boxes were sent to homesteaders on Kauai.

Respectfully,

DAVID HAUGHS,  
Forest Nurseryman.

## DIVISION OF HYDROGRAPHY.

Honolulu, December 9, 1914.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography during month of November, 1914, is submitted:

*Rainfall.*

During the first half of the month rainfall throughout the islands was generally light, but during the latter part of the month several heavy storms occurred, though not of sufficient intensity to cause much damage.

*Ditch Seepage Investigations.*

Following our proposal to the Hawaiian Sugar Planters' Association to extend experiments in ditch seepage losses, seven more plantations have expressed a desire to coöperate with the Division of Hydrography in this work. The following plantation companies have expressed a desire to have seepage loss investigations conducted on their irrigation ditches:

Honolulu Plantation Company, Oahu.  
Ewa Plantation Company, Oahu.  
Maui Agricultural Company, Maui.



Kekaha Sugar Company, Kauai.

Pioneer Mill Company, Maui.

Oahu Sugar Company, Oahu.

Waialua Agricultural Company, Oahu.

Seepage investigations on these plantations will be started shortly after January 1, 1915.

Several experiments in seepage losses completed in November at the Waipio experimental farm show an average loss of 7 per cent in the main ditches, and about 9 per cent in the level ditches.

### *Oahu.*

Mr. Kimble visited the coöperative stations on the Kahuku and Laie plantations, and completed the field work and report on seepage losses at Waipio experimental farm.

Mr. Austin visited 30 gaging stations during the month and made 22 regular and one miscellaneous measurements.

The acting superintendent of Hydrography visited 13 gaging stations on Oahu. The latter part of the month was spent on a visit to Maui to inspect the clock register stations.

### *Kauai.*

The last of the construction work to be undertaken at present on Kauai was finished during the month, with the completion of the Stevens clock register station on East Wailua Stream. The gage house on the North Wailua Stream station was moved back to a higher elevation and just in time to escape damage by a heavy flood which occurred a few days after its removal.

Mr. Dort visited 11 gaging stations and made 12 regular and one miscellaneous discharge measurements. Mr. Horner visited 10 gaging stations and made three discharge measurements at regular stations. He also visited 10 rainfall stations.

### *Maui.*

As Mr. Bailey spent the greater part of the month in Honolulu as acting superintendent of Hydrography, the only work done on Maui was to make an inspection trip to the clock register stations. During the period November 24 to 30th Mr Bailey visited one rainfall station and 19 stream gaging stations,—making two discharge measurements.

### *Kona, Hawaii, Report.*

Mr. Kimble spent four days assembling and preparing data maps, and estimates on the Kona report. This will be completed by December 31, 1914.

*Plans for December, 1914.***Oahu.**

Mr. Kimble will complete the Kona report which will take about two weeks. He will also visit the coöperative stations on Kahuku and Laie plantations.

Office work on data for 1914 report will be brought as nearly up to date as possible.

**Kauai.**

The work on Kauai during December will be chiefly maintenance. An attempt will be made to procure desirable measurements to further develop the rating curves,—especially at the new stations.

**Maui.**

The only work to be done on Maui will be a trip to inspect automatic gages and procure fourth-quarter records.

**Hawaii.**

The Acting Superintendent of Hydrography will visit Hawaii about the middle of the month to secure discharge data desired by the territorial Attorney-General.

**General.**

Mr. Larrison, who is attending a conference of the district engineers of the U. S. Geological Survey held in Washington, D. C., in December, is expected to return to Honolulu about the middle of January, 1915.

Very respectfully,

C. T. BAILEY,  
Acting Superintendent of Hydrography.

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During the past two years forest officers have killed nearly 9000 predatory animals, more than three-fourths of which were coyotes.

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The arboretum established at Washington in Rock Creek Park, through co-operation between the forest service and the District of Columbia, now contains 1200 trees, comprising 92 different species.

## A BIOLOGICAL SURVEY OF OAHU.

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By Vaughan MacCaughey.

Professor of Botany, College of Hawaii.

The first step in the development of any comprehensive project is a survey of the field. This is true in engineering, in social relief, in science. The preliminary survey, the reconnaissance, the sweeping view of the large topography, these are the initial and necessary steps. The ultimate completeness of the survey may depend upon any one of a considerable number of governing factors. Limited facilities may compel a survey to be meager and inadequate; obscure and highly complicated problems may prolong it over a long period of time. Whatever may be the status of its scope or thoroughness, the survey work normally precedes and underlies the other investigational work of its field.

In the realm of natural history we find a striking variety of surveys. The remarkable explorations of Humboldt, Darwin, Lewis and Clark; the expeditions of the Challenger and of the Albatross; the surveys undertaken by governmental bureaus—meteorological, soils, botanic, topographic, ornithologic, silvic; the minute local records of such naturalists as White, Thoreau, and Burroughs—these are fairly representative of the various widely differing types of natural history surveys.

## THE FEDERAL SURVEY.

The term "biological survey" has several applications. One of the bureaus of the federal department of agriculture is designated as the Biological Survey. Due to the historical peculiarities of governmental organization this bureau's "biological" work is in reality limited largely to problems relating to native birds and mammals of economic importance. Its work, for example, does not usually include fishes, (these being the concern of the United States Fish Commission),

During the past three years survey work by the federal bureau has been maintained in Alabama, California, Idaho, Louisiana, Wyoming, North Dakota, Mississippi, and New Mexico. The bureau reports that "requests for coöperation in biological survey of Iowa and Nebraska have been received and work in those states will be inaugurated as soon as appropriations are available. . . . For several years requests have been received for coöperation with the State University and State Agricultural College of North Dakota in a biological survey of the State. . . . By the plan of coöperation arranged the Biological Survey and the State are to share equally in the expenses of field work and in preparing final reports."

The sense in which the term "biological survey" is used in this paper is as follows. A biological survey of a given region is an enumeration of all of the organisms, (both plants and animals, fossil and living), that inhabit the region, together with an adequate explanation for the specific distribution, both in time and space, of each organism. This definition includes then two types or classes of data, first, the list of plants and animals; second, statements elucidating the distribution of each form. As stated by Dr. C. Hart Merriam, for many years Chief of the U. S. Biological Survey,—“The primary object of mapping the geographic distribution of species is to ascertain the number, positions and boundaries of the natural faunal and floral areas—areas which are fitted by nature for the existence of certain native animals and plants. . . . The obvious reason why certain animals and plants inhabit restricted parts of the earth's surface and do not occur in other parts, where there are no impassable barriers to prevent, is that such species have become adapted to the particular physical and climatic conditions there prevailing, and their sensitive organizations are not sufficiently plastic to enable them to live under other conditions.

“The present biological survey . . . has demonstrated that mammals, birds, reptiles, insects and plants so coincide in distribution that a map showing the boundaries of an area inhabited by an association of species in one group serves equally well for other groups. The reason for this coincidence in distribution is that all terrestrial forms of life inhabiting the same area are exposed to the same surroundings and governed by the same general laws.”

It is at once evident that whereas the first function of this survey is purely biological, the second is dependent upon surveys conducted by the other sciences. Statements as to the distribution of each organism have little significance until preceded by the following surveys:

1. Topography or physiographic.
2. Hydrographic.
3. Geologic.
4. Meteorologic or climatic.
5. Soils.

With this data available, the proper correlations can be made between the distribution of organisms and the physical factors of their environment.

#### SURVEYS IN HAWAII.

The Hawaiian Islands, although known to scientists for over a century, and notable among island groups for their remarkable natural history phenomena, have never been favored with a biological survey. Scientific work of greatest value

has been consummated in various isolated aspects of Hawaiian natural history, and embodied in appropriate and substantial publications. The following list includes the larger and more important of these studies.

Ocean, Marine Life and Fishes—U. S. Fish Commission Reports.

Geology, Volcanoes—Brigham, Hitchcock, Dutton, Perret, Dana, Volcano Research Association, etc.

Topography—Maps of U. S. Topographic Survey; Coast and Geodetic Survey.

Weather and Climate—Reports of U. S. Weather Bureau.

Soils—Reports of U. S. Experiment Station, H. S. P. A. Experiment Station.

Hydrography—Reports of U. S. Hydrographic Survey.

Plants—Hillebrand, Gray, Mann, Brigham, Wawra, Forbes, Rock, Board of Agriculture and Forestry, U. S. Forest Service.

Animals—Fauna Hawaiiensis.

Birds—Birds of the Sandwich Islands; Bryan.

Insects—Fauna Hawaiiensis, papers of Hawaiian Entomological Society.

Molluscs—Gulick, Pillsbury, Cooke.

The total literature describing Hawaiian natural history is thus evidently both extensive and diversified. Practically every aspect of nature has been monographed in some form or other. The great unaccomplished task is the proper co-ordination of this diffused mass of data, in a form that will make possible the accurate plotting of biologic zones.

#### STATEMENT IN FAUNA HAWAIIENSIS.

Perhaps the most sumptuous and scholarly account of Hawaiian natural history is the splendid British "Fauna Hawaiiensis," "being results of the explorations instituted by the Joint Committee appointed by the Royal Society of London for Promoting Natural Knowledge and the British Association for the Advancement of Science and carried on with the assistance of those bodies and of the trustees of the Bernice Pauahi Bishop Museum at Honolulu." The committee was appointed in 1890, the last volume of this monumental work is dated January 15, 1913. The following excerpts from the preface of Dr. Sharp are significant in connection with the proposed biological survey:

"The committee decided to undertake an exploration of the Islands, and was so fortunate as to secure for the purpose the services of Mr. R. C. L. Perkins, then a young graduate of the University Oxford. Dr. Perkins continued his exploration for some years. As he has given an account thereof in the Introduction that follows this prefatory notice, it is unnecessary to give particulars here, beyond saying that he underwent great

dangers and fatigues, in his arduous and solitary task, with the most determined perseverance, the most unflinching courage; camping out in the mountains, without a companion, for periods as long as he was able to carry food and equipment.

As the result of his work the Committee found itself in possession of an enormous number of specimens, and in pursuance of its work decided on investigating this material and reporting thereon.

It is not possible to state exactly the number of specimens that have resulted from Dr. Perkins' labors, but it cannot be far short of 100,000, and not improbably exceeds that number. The Insects of the Archipelago were previous to this investigation supposed to be scanty in the number of species, and it was believed that individuals of each species were as a rule also very few. Both these conclusions have now been shown to be incorrect. Dr. Perkins estimates the number of known species of this class of animals to be upwards of 3300; and he considers this number to be probably not much more than one-half of the total Hawaiian Insect-fauna.

The other Classes of Arthropoda are represented by a considerable number of species. Mollusca is specially rich, nearly 500 species or forms having been recorded. Aves has about 50 peculiar species. The other classes of animals have been by no means satisfactorily investigated, so that no general zoological census of the islands can yet be given. But it may be said that at the present time if an exhaustive list of the land and marine fauna could be compiled it might amount to 10,000 species, the great majority of them being peculiar to these precincts. And even this number is liable to be greatly increased if the classes of microscopic animals were included; the Protozoa being, so far as is known to the writer, still untouched. These points are mentioned because it would be a matter for profound regret were it supposed that the work of this committee—long as it may have lasted—has completed our knowledge of Hawaiian zoology. The islands having now passed into the control of a State super-abundant in wealth and power we may hope that some real effort may be made, by means of local associations or expeditions from the United States, to supplement our imperfect knowledge."

#### BEGIN WITH OAHU.

A detailed biological survey is a time-consuming and expensive undertaking. Parties must be maintained in the field for considerable periods, or numerous short expeditions must be carefully planned and made. In either case a suitable base is of great importance. For these and other reasons it seems desirable that the Island of Oahu be chosen as the field for the first biological survey. The following reasons may be stated:

1. Oahu includes a striking variety of ecologic areas. For example within a radius of half a dozen miles of the College of Hawaii campus occur the following well-defined ecological districts:

1. Manoa Valley—one of the largest of the Oahu valleys, with a large amphitheater of erosion; broad, flat floor; and precipitous, ridged walls.

2. Waikiki Flats—extensive coastal plain, artificially flooded, and planted with various wet-land crops.

3. Kaimuki Region—secondary volcanic craters, with lava flows and volcanic debris.

4. Extinct craters of Diamond Head, Punchbowl, Round-top, Sugar-loaf, Tantalus and Kaau.

5. Coral Reefs—lagoons and fringing reefs, along the entire southern coast of Oahu; rich in marine life.

6. Waialae—an arid portion of the coastal plain, with tongues into the valleys adjacent.

7. Koolau Range—average elevation 2200 feet, with dense indigenous rain-forest.

8. Introduced plantings—eucalyptus, prosopis, etc., in extensive groves and woodlands.

9. Strand regions—comprising coral, lava and tufa beaches.

10. Valleys and streams—Moanalua, Kalihi, Nuuanu, Pauoa, Makiki, Manoa, Palolo, Waialae, etc.

11. Foothills and ridges—eroded remnants of the original Koolau volcanic dome.

12. Caverns and “lava tubes”—formed chiefly through former volcanic action.

13. Deep Sea—at a relatively short distance from the shore line.

This list is not complete nor detailed, but it will serve to indicate the unique variety of life-conditions.

2. The various parts of the island are easily accessible. To quote a previous article:

“From the standpoint of collegiate studies, all of these regions are quite accessible; many of them are within half-day’s walk, and the most remote can be reached within a day. In addition to the system of public roads, plantation roadways, wagon trails, and foot trails, there are two railway lines, a number of stage lines, and motor car services. There are also available a number of excellent maps, including trail maps. Food supplies and drinking water are obtainable throughout the island. It is therefore a relatively simple matter to make an expedition to any given region, to transport needful scientific apparatus and equipment, and to continue the studies and collecting for as long a period as is desirable.

There is perhaps no other region in the world, similarly blessed with all of the conveniences of modern civilized socie-

ty, where so many widely differing types of tropical environment are so easily available within small compass."

3. Honolulu, with its numerous scientific bureaus and educational institutions, can serve most favorably as a base.

4. These same bureaus, schools, and other organizations can make good use of the results of such a survey. A biological survey of Oahu would be utilized by a large number of individuals and institutions, both private and governmental. Two quotations from publications of the College of Hawaii will illustrate this point:

"Not only is this remarkably varied region quite available for college work and investigation, but it is also accessible every day in the year, due to the charming climatic conditions of Hawaii. The absence of a winter season, the entire absence of snow and frost, the great rarity of storms, and the balmy quality of the showers, make it possible to conduct field studies on any day of the college year. There is no dormant or leafless season; plant life flourishes throughout the year, and field observations and collecting suffer no abrupt changes because of seasonal inclemencies.

"The natural background of the college thus afford an unrivalled out-door laboratory. It is the policy and practice of the botanical instruction of the college to utilize, so far as is practicable, this natural background. Field work holds an important place in both elementary and advanced instruction. The abundance of fresh material, easily obtainable, adds to the effectiveness of all of the biological instruction."

1. Field Biology. A course consisting of field work, designed to give the students a vivid and first-hand knowledge of the biological world. Within easy reach of the college is an unusual variety of representative biologic regions. The natural history of these type regions is studied in situ, and recorded in written reports.

One afternoon (1-5 p. m.) per week; four all-day excursions by arrangement. 2nd semester, 1 credit. Prerequisites: Botany 1, and Zoology 1.—Professors Bryan and MacCaughy.

#### PHYSICAL FEATURES OF OAHU.

An excellent concise statement of the general physical features of Oahu appears in Martin and Pierce's "Water Resources of Hawaii (U. S. Geological Survey, Water Supply Paper No. 318). This account will serve to describe in a fairly complete manner the area for which a biological survey is proposed.

"The Island of Oahu lies midway between Kauai on the northwest and Maui on the southeast. It is separated from Kauai by Kaieie Waho channel (width 63 miles), and from Molokai, which lies between Oahu and Maui, by Kaiwi chan-



nel (width 23 miles). It is 2100 miles southwest of San Francisco in latitude  $21^{\circ} 30'$  north and longitude  $158^{\circ}$  west. It is somewhat north of the geographic center of the main group, and is third in size, but it is pre-eminently the most important member of the group.

"In shape Oahu is somewhat trapezoidal. The bases of the trapezoid are at the northeast and the southwest, and the legs are at the south and northwest, the latter being at right angles to the base. The longer base is about 37 miles long; the shorter, about 22 miles. The legs at the south and northwest are about 29 and 22 miles in length respectively. The shortest distance across the tableland from Kaiaka Bay at the north of Pearl Lochs at the south, which extends 5 miles inland, is about  $15\frac{1}{2}$  miles. The total area of Oahu is 598 square miles, as compared with 4015 square miles for Hawaii and 728 for Maui.

#### MOUNTAIN RANGES.

"Oahu Island has two distinct mountain ranges, a feature which makes it unique as compared with the other islands, none of which has any distinct mountain range. The Koolau range at the northeast extends the full length of the island, the crest being approximately parallel to the shore and only 3 or 4 miles inland. The Waianae range extends almost the entire length of the southwest side, the crest being from 1 to 5 miles from the shore. These ranges are separated by a tableland which rises to an elevation of 800 feet in the saddle near the center of the island, from which point it slopes gently downward to the north and to the south. Both these ranges are at right angles to the northeast trade winds which blow for about nine months of the year, and both are exposed more or less to the severe southwestern storms, or konas, which prevail at times. Each shields the other to a greater or less extent, and this helps to explain some of the present physical features.

"The Waianae mountains are very much older than the Koolau mountains. They are probably as old as Kauai, and originally formed a single island much larger and higher than the present Waianae mountains. Erosion had probably eaten deeply into the northeastern and southwestern slopes and completely obliterated all trace of the original crater long before the Koolau mountains on the east had emerged from the ocean. The successive lava flows from younger Koolau then piled up along the eastern base of Waianae, filling the valleys and covering the ridges, thus obliterating the effects of earlier channeling on that side. On the southwest side, however, nothing of the kind has occurred. The original valleys have been broadened, deepened, and extended farther into the heart of

the mountains where they terminate in almost vertical corrugated walls. Lualualei, Waianae and Makaha are the most prominent of these valleys. Kaala peak, back of Waianae valley, elevation 4040 feet, is the highest point on Oahu.

"The Koolau mountains came into being long after the Waianae mountains. They were built up by successive lava flows which, on the west, overlapped the eastern slopes of Waianae and filled up its valleys. As soon as the Koolau range had reached a sufficient height it formed a wind barrier in the path of the trades, which largely robbed the clouds of their moisture before they reached the Waianae mountains, so that thereafter the rainfall in these mountains became much less, with the result that the denuding agencies also became less active. The Koolau Range not only protects the Waianae mountains on the west but is in turn shielded by them from the severe kona storms that come from the southwest. The extent of this protection is well shown by the great difference in erosion on the western and southern slopes of the Koolau mountains. On the south the slopes are unprotected, with the result that deep, broad valleys, such as Palolo, Manoa, Nuuanu and Kalihi, all back of Honolulu, have eaten their way into the very core of the range. Indeed, Nuuanu and Kalihi have cut through the core forming the low pass at the head of each valley.

"The eastern side of Koolau range is very much unlike the western side. It is divided into two parts by the Kualoa ridge, or spur, which juts out from the middle of the main range as a sort of headland north of Waikane. North of Kualoa are several deep valleys which extend well back into the range and are separated from each other by spur ridges that branch off from the main range. The valleys and ridges have probably resulted entirely from erosion. South of Kualoa the spur ridges separating the different valleys are almost entirely wanting. The result is that the heads of the various short alcove valleys form an almost continuous corrugated wall or precipice, 3 or 4 miles from shore, 1000 to 1200 feet high and 10 or 12 miles long. The area between the sea and the base of the cliffs is comparatively open rolling country across which short streams course to the sea. The existing cliff forms may be due entirely to erosion, as maintained by some authorities, wholly subaerial or partly submarine, or they may have originated in a long fissure, as suggested by Dana, which resulted in a mass east of the rupture sliding into the sea. As bearing on Dana's theory, it is interesting to note that practically all the streams south of Kualoa seem to originate in constant high level springs which are about 1000 feet above the sea back of Waikane and Waiahole and decrease in elevation toward the south. These springs appear to emerge from porous strata

overlying an impervious stratum which dips gently to the south and probably to the west away from the face of the cliff.

#### DIVERSIFIED SHORE AND CORAL REEFS.

"The shore line of Oahu is much more irregular than the shore line of any of the other islands. There are important points on all sides of the island, the most prominent of which are Diamond and Koko Heads, Makapuu, Mokapu, Kahuku, Kaena and Barbers points. There are also good bays, the most important of which are at Honolulu and Pearl harbors on the south side. Pearl Lochs, 6 or 7 miles west of Honolulu, is the site of the naval station and is said to form one of the safest and best harbors on the Pacific.

"Oahu has more coral on and around it than any of the other islands. Extensive living coral reefs almost completely girdle the island, closing the entrance to the bays except where enough fresh water is received from streams or springs to maintain an opening to the sea. The coastal plain which extends almost entirely around the island consists mainly of uplifted coral, especially on the south side; and coralline limestone strata are encountered in well borings at various depths below sea level.

"The distribution of coral below and above sea level is one of the principal evidences of long periods of subsidence followed by later upheaval. Well borings show alternations of basalt clay, earth, limestone, and hard basaltic sheets to a depth of several hundred feet. Hard coral has been encountered at 800 feet below sea level, and broken coral at somewhat greater depth. These facts lead to the conclusion that the island has been depressed 700 or 800 feet. Surface coral near the shore indicated a later upheaval of 50 feet or more. At Waipio, just west of Pearl Lochs, there is a stratum of oyster shells 3 or 4 feet thick and probably 20 feet or more above sea level.

#### HYDROGRAPHY.

"The conditions just described have given to Oahu the distinction of having the best artesian water supply of any of the islands. The principal water-bearing stratum is a vesiculated basalt which lies 300 to 400 feet below sea level and which is overlain by an impervious cover. The water in flowing wells originally reached 42 feet above sea level at Honolulu, 32 feet at Ewa, and 26 feet at Kahuku. The height is now considerably less than it was originally. In addition to the large number of flowing wells, there are many others which are pumped. In all nearly 500 wells have been sunk on Oahu, chiefly on the south side.

"The rainfall on Oahu is comparatively less than on the

*Plans for December, 1914.*

## Oahu.

Mr. Kimble will complete the Kona report which will take about two weeks. He will also visit the coöperative stations on Kahuku and Laie plantations.

Office work on data for 1914 report will be brought as nearly up to date as possible.

## Kauai.

The work on Kauai during December will be chiefly maintenance. An attempt will be made to procure desirable measurements to further develop the rating curves,—especially at the new stations.

## Maui.

The only work to be done on Maui will be a trip to inspect automatic gages and procure fourth-quarter records.

## Hawaii.

The Acting Superintendent of Hydrography will visit Hawaii about the middle of the month to secure discharge data desired by the territorial Attorney-General.

## General.

Mr. Larrison, who is attending a conference of the district engineers of the U. S. Geological Survey held in Washington, D. C., in December, is expected to return to Honolulu about the middle of January, 1915.

Very respectfully,

C. T. BAILEY,  
Acting Superintendent of Hydrography.

---

During the past two years forest officers have killed nearly 9000 predatory animals, more than three-fourths of which were coyotes.

---

The arboretum established at Washington in Rock Creek Park, through co-operation between the forest service and the District of Columbia, now contains 1200 trees, comprising 92 different species.

## A BIOLOGICAL SURVEY OF OAHU.

By Vaughan MacCaughey.

Professor of Botany, College of Hawaii.

The first step in the development of any comprehensive project is a survey of the field. This is true in engineering, in social relief, in science. The preliminary survey, the reconnaissance, the sweeping view of the large topography, these are the initial and necessary steps. The ultimate completeness of the survey may depend upon any one of a considerable number of governing factors. Limited facilities may compel a survey to be meager and inadequate; obscure and highly complicated problems may prolong it over a long period of time. Whatever may be the status of its scope or thoroughness, the survey work normally precedes and underlies the other investigational work of its field.

In the realm of natural history we find a striking variety of surveys. The remarkable explorations of Humboldt, Darwin, Lewis and Clark; the expeditions of the Challenger and of the Albatross; the surveys undertaken by governmental bureaus—meteorological, soils, botanic, topographic, ornithologic, silvic; the minute local records of such naturalists as White, Thoreau, and Burroughs—these are fairly representative of the various widely differing types of natural history surveys.

## THE FEDERAL SURVEY.

The term "biological survey" has several applications. One of the bureaus of the federal department of agriculture is designated as the Biological Survey. Due to the historical peculiarities of governmental organization this bureau's "biological" work is in reality limited largely to problems relating to native birds and mammals of economic importance. Its work, for example, does not usually include fishes, (these being the concern of the United States Fish Commission),

During the past three years survey work by the federal bureau has been maintained in Alabama, California, Idaho, Louisiana, Wyoming, North Dakota, Mississippi, and New Mexico. The bureau reports that "requests for coöperation in biological survey of Iowa and Nebraska have been received and work in those states will be inaugurated as soon as appropriations are available. . . . For several years requests have been received for coöperation with the State University and State Agricultural College of North Dakota in a biological survey of the State. . . . By the plan of coöperation arranged the Biological Survey and the State are to share equally in the expenses of field work and in preparing final reports."

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THE  
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other large islands. It ranges from 31 inches a year in the business center of Honolulu to 21 inches at Ewa and Waianae, all on the south side. On the mauka side of Honolulu City the rainfall ranges from 40 or 50 inches to 90 inches just back of the city. The rainfall reaches 140 or 150 inches in Nuuanu and Manoa valleys, but is considerably less on the mountains. On the windward side of the island the rainfall is less than 100 inches. It probably does not exceed 100 inches on an average anywhere on the Koolau range. On the Waianae range the rainfall is light.

"The forest cover is restricted largely to the higher slopes which are now in forest reserves and are being reforested. The lower slopes have been largely denuded by cattle.

"On account of the nature and arrangement of Oahu's mountain ranges there are fewer running streams than on the other large islands. The streams that exist are also smaller, as a rule. Except near Honolulu, most of the streams on the west side of the Koolau mountains are intermittent in flow. For a short time after storms they carry water which is taken into ditches constructed for storm water, but they are practically dry for the greater part of the time. Kaukonahua stream, at Wahiawa, is the largest on the west side of Koolau range. All the streams on the east side of Koolau range are short, but they have a good flow. Waianae is the principal stream from the Waianae mountains. What Oahu lacks in surface supply is largely made up from underground sources. Cane, rice, and taro are extensively irrigated on this island. Pineapples require no irrigation.

"Transportation facilities are better on Oahu than on any of the other islands. A belt road crosses the Koolau range and the tableland between the mountain ranges, and a railroad extends almost completely around the island. It is thus easier to carry on field operations on this island than on the others."

#### SYNOPSIS OF THE SURVEY.

The survey of Oahu, as proposed, would have as its main lines of work the following:

1. A topographic survey, resulting in an accurate topographic map, showing contour intervals and all important physiographic features. This work has already been completed, but not made available, by the U. S. Army Engineer Corps.
2. A hydrographic survey, showing geographic and seasonal distribution of all waters. This work has been accomplished by the U. S. Geological Survey, as above referred to.
3. A geological and soil survey, mapping the important geologic formations and soil types. Much data is already available in the publications of various geologists (for exam-

ple, Hitchcock's "Geology of Oahu") and experiment stations, (for example, Maxwell's "Soils of Hawaii").

4. Compilation of climatic records from U. S. Weather Bureau, plotting the geographic and seasonal variation at representative stations.

5. Compilation of faunal and floral "locality records" from all available sources, and the plotting of zonal distribution of representative or "Key" organisms.

6. The formation of generalized statements and biologic laws.

The value of a survey of this kind, both scientific and economic, would be very great. Moreover it would be cumulative, the survey being a base record and guide for the continuation of similar scientific work. And lastly, such a survey would bring together in available and interpreted form a large mass of widely scattered, inaccessible and uncorrelated natural history data.

---

Forest fires in British Columbia covered more than 300,000 acres during the past year.

---

Mention is made in the forest notes issued to the press from Washington that there is a big market in Hawaii for box shooks for packing canned pineapple and pineapple juice.

---

There were 400 fires this year in the national forests of Utah, southern Idaho, western Wyoming, and Nevada, or 15 more than in the most disastrous season of 1910. Yet the cost of extinguishing them was only one-third and the damage only one-thirtieth of that of the earlier year. The difference is due to better organization now, and to more roads, trails and telephones.

---

It is said that the German invaders of Belgium, whatever else they may have destroyed, have been careful not to injure park trees. The cavalrymen, so a report goes, are forbidden to tie their horses to trees for fear that the animals will gnaw the bark. Germany was the first nation to apply forestry on a large scale, some of the crown forests having been under scientific management for over a hundred years.

---

A surprisingly large number of substances, ranging all the way from the condensed fumes of smelters to the skimmed milk of creameries, have been tried or suggested as means of preserving wood from decay. Most of them, however, have been found to have little or no value for the purpose. Certain forms of coal-tar creosote and zinc chloride are the most widely used wood preservatives.

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A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

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The Division of Hydrography has on hand free publications relative to the water resources of the Hawaiian Islands. These publications furnish detailed data as to daily, monthly, mean, maximum, and minimum run-off of streams and ditches, and also cuts and maps pertaining to the different islands. Much descriptive data relative to the mountain ranges and physical configuration of each island are also contained. These publications will be mailed free of charge on request.

The United States Geological Survey topographic map of Kauai is also on sale, and copies will be mailed on receipt of 50 cents.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

This division will also make ditch seepage losses and utilization investigations when the actual cost of the labor, materials, subsistence, transportation, etc., of such investigations is paid by those benefited.

G. K. LARRISON,  
Superintendent of Hydrography.

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The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

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All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

DAVID HAUGHS,  
Acting Superintendent of Forestry.

---

### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

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PAGE

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## COYOTES SPREAD HYDROPHOBIA.

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The spreading of rabies by infected coyotes among cattle grazing in the national forests has assumed a grave aspect, according to a report received by the forest service in Washington from the district forester in charge of the forests in Washington and Oregon. Numerous townships in eastern Oregon, it is reported, have ordered that all dogs be muzzled lest those that have been bitten by rabid coyotes develop hydrophobia and attack humans or domestic animals.

Efforts are being made by the state authorities of Oregon to stop the spread of hydrophobia by this means and officers of the forest service are cooperating in attempts to kill off the coyotes. In one county alone a loss of three hundred head of cattle is charged to rabid coyotes.

---

Besides the usual toll of pests intercepted the superintendent of entomology, with his report for last month, presents an encouraging statement of progress in breeding and distributing fruitfly parasites by Mr. Fullaway.

---

Dr. Norgaard's report for the closing month of last year shows the practical elimination of bovine tuberculosis on the Island of Oahu—the entire source of the capital city's milk supply—after a campaign by the division of animal industry extending over less than five years. This, too, has been accomplished with the unexampled obviation of any claim for compensation for reacting animals destroyed. Another gratifying fact in the report for December is that of the absolute suppression of glanders among horses and mules. Moreover, the effective control of hog cholera in the Territory indicated in previous reports is to be placed to the credit of the division.

---

In the April, 1914, number of the Forester an item about "electrified chickens" appeared, relating the success of electric incubators. Now we have electrified bees, in the following news





upon moved by Mr. Rice, seconded by Mr. Dowsett and unanimously carried that the above sum be allotted for such additional quarters. Those present agreed, however, that this sum be not exceeded, and the executive officer was therefore requested to keep informed as to the progress of the work.

#### REQUEST OF PROF. BRIGHAM.

Regarding request of Prof. W. T. Brigham, director of the Bishop Museum, for permission to explore government lands under the jurisdiction of this board for the purpose of collecting botanical and other scientific specimens, the chairman stated that the matter had been submitted to the Attorney General whereby the request would be granted in accordance with the provisions of Chapter 63 of the R. L. of 1905, and of Section 3196 of said Revised Laws as amended by Act 26, Laws of 1909.

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#### CLAIM AGAINST HILO SUGAR COMPANY.

President Waterhouse stated there was nothing new to report in connection with the claim against the Hilo Sugar Company for \$220 for lumber and iron removed from the premises of the old quarantine station at Punohoa, Hilo, Hawaii.

other large islands. It ranges from 31 inches a year in the business center of Honolulu to 21 inches at Ewa and Waianae, all on the south side. On the mauka side of Honolulu City the rainfall ranges from 40 or 50 inches to 90 inches just back of the city. The rainfall reaches 140 or 150 inches in Nuuanu and Manoa valleys, but is considerably less on the mountains. On the windward side of the island the rainfall is less than 100 inches. It probably does not exceed 100 inches on an average anywhere on the Koolau range. On the Waianae range the rainfall is light.

"The forest cover is restricted largely to the higher slopes which are now in forest reserves and are being reforested. The lower slopes have been largely denuded by cattle.

"On account of the nature and arrangement of Oahu's mountain ranges there are fewer running streams than on the other large islands. The streams that exist are also smaller, as a rule. Except near Honolulu, most of the streams on the west side of the Koolau mountains are intermittent in flow. For a short time after storms they carry water which is taken into ditches constructed for storm water, but they are practically dry for the greater part of the time. Kaukonahua stream, at Wahiawa, is the largest on the west side of Koolau range. All the streams on the east side of Koolau range are short, but they have a good flow. Waianae is the principal stream from the Waianae mountains. What Oahu lacks in surface supply is largely made up from underground sources. Cane, rice, and taro are extensively irrigated on this island. Pineapples require no irrigation.

"Transportation facilities are better on Oahu than on any of the other islands. A belt road crosses the Koolau range and the tableland between the mountain ranges, and a railroad extends almost completely around the island. It is thus easier to carry on field operations on this island than on the others."

#### SYNOPSIS OF THE SURVEY.

The survey of Oahu, as proposed, would have as its main lines of work the following:

1. A topographic survey, resulting in an accurate topographic map, showing contour intervals and all important physiographic features. This work has already been completed, but not made available, by the U. S. Army Engineer Corps.
2. A hydrographic survey, showing geographic and seasonal distribution of all waters. This work has been accomplished by the U. S. Geological Survey, as above referred to.
3. A geological and soil survey, mapping the important geologic formations and soil types. Much data is already available in the publications of various geologists (for exam-

ple, Hitchcock's "Geology of Oahu") and experiment stations, (for example, Maxwell's "Soils of Hawaii").

4. Compilation of climatic records from U. S. Weather Bureau, plotting the geographic and seasonal variation at representative stations.

5. Compilation of faunal and floral "locality records" from all available sources, and the plotting of zonal distribution of representative or "Key" organisms.

6. The formation of generalized statements and biologic laws.

The value of a survey of this kind, both scientific and economic, would be very great. Moreover it would be cumulative, the survey being a base record and guide for the continuation of similar scientific work. And lastly, such a survey would bring together in available and interpreted form a large mass of widely scattered, inaccessible and uncorrelated natural history data.

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Forest fires in British Columbia covered more than 300,000 acres during the past year.

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Mention is made in the forest notes issued to the press from Washington that there is a big market in Hawaii for box shooks for packing canned pineapple and pineapple juice.

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There were 400 fires this year in the national forests of Utah, southern Idaho, western Wyoming, and Nevada, or 15 more than in the most disastrous season of 1910. Yet the cost of extinguishing them was only one-third and the damage only one-thirtieth of that of the earlier year. The difference is due to better organization now, and to more roads, trails and telephones.

---

It is said that the German invaders of Belgium, whatever else they may have destroyed, have been careful not to injure park trees. The cavalymen, so a report goes, are forbidden to tie their horses to trees for fear that the animals will gnaw the bark. Germany was the first nation to apply forestry on a large scale, some of the crown forests having been under scientific management for over a hundred years.

---

A surprisingly large number of substances, ranging all the way from the condensed fumes of smelters to the skimmed milk of creameries, have been tried or suggested as means of preserving wood from decay. Most of them, however, have been found to have little or no value for the purpose. Certain forms of coal-tar creosote and zinc chloride are the most widely used wood preservatives.

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(1915)

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Arthur H. Rice

J. M. Dowsett

Walter M. Giffard

H. M. von Holt

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Walter D. McBryde, *in charge of Sub-Nursery at Homestead, Kauai.*

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L. N. Case, *Assistant Territorial Veterinarian.*

H. B. Eliot, *Deputy Territorial Veterinarian for Hawaii.*

J. C. Fitzgerald, *Deputy Territorial Veterinarian for Maui.*

A. R. Glaisyer, *Deputy Territorial Veterinarian for Kauai.*

## DIVISION OF HYDROGRAPHY.

G. K. Larrison, *Superintendent of Hydrography.*

J. C. Dort, *Engineer in Charge, Kauai; Headquarters at Lihue.*

C. T. Bailey, *Engineer in Charge, Maui; Headquarters at Wailuku.*

H. Kimble, *Engineer in Charge of Construction, Oahu.*

H. A. R. Austin, *Junior Engineer, Oahu.*

E. Goo, *Clerk.*

## CLERICAL STAFF.

Mrs. A. Oram, *Stenographer and Librarian.*

Mrs. C. L. Seybolt, *Clerk.*

Maniel Logan, *Editor of the Forester.*

# Board of Agriculture and Forestry

## PUBLICATIONS FOR DISTRIBUTION.

The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

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## DIVISION OF HYDROGRAPHY.

Rooms 20-22 Kapiolani Bldg. Tel. No. 3662.

The Division of Hydrography has on hand free publications relative to the water resources of the Hawaiian Islands. These publications furnish detailed data as to daily, monthly, mean, maximum, and minimum run-off of streams and ditches, and also cuts and maps pertaining to the different islands. Much descriptive data relative to the mountain ranges and physical configuration of each island are also contained. These publications will be mailed free of charge on request.

The United States Geological Survey topographic map of Kauai is also on sale, and copies will be mailed on receipt of 50 cents.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

This division will also make ditch seepage losses and utilization investigations when the actual cost of the labor, materials, subsistence, transportation, etc., of such investigations is paid by those benefited.

G. K. LARRISON,  
Superintendent of Hydrography.



VOL. XII.

FEBRUARY, 1915

No. 2

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AND  
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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

**DAVID HAUGHS,**  
Acting Superintendent of Forestry.

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### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications  
**SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 2  
HONOLULU, HAWAII.**

**EDW. M. EHRHORN,**  
Superintendent

# THE HAWAIIAN FORESTER & AGRICULTURIST

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## COYOTES SPREAD HYDROPHOBIA.

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The spreading of rabies by infected coyotes among cattle grazing in the national forests has assumed a grave aspect, according to a report received by the forest service in Washington from the district forester in charge of the forests in Washington and Oregon. Numerous townships in eastern Oregon, it is reported, have ordered that all dogs be muzzled lest those that have been bitten by rabid coyotes develop hydrophobia and attack humans or domestic animals.

Efforts are being made by the state authorities of Oregon to stop the spread of hydrophobia by this means and officers of the forest service are coöperating in attempts to kill off the coyotes. In one county alone a loss of three hundred head of cattle is charged to rabid coyotes.

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Besides the usual toll of pests intercepted the superintendent of entomology, with his report for last month, presents an encouraging statement of progress in breeding and distributing fruitfly parasites by Mr. Fullaway.

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Dr. Norgaard's report for the closing month of last year shows the practical elimination of bovine tuberculosis on the Island of Oahu—the entire source of the capital city's milk supply—after a campaign by the division of animal industry extending over less than five years. This, too, has been accomplished with the unexampled obviation of any claim for compensation for reacting animals destroyed. Another gratifying fact in the report for December is that of the absolute suppression of glanders among horses and mules. Moreover, the effective control of hog cholera in the Territory indicated in previous reports is to be placed to the credit of the division.

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In the April, 1914, number of the Forester an item about "electrified chickens" appeared, relating the success of electric incubators. Now we have electrified bees, in the following news

item from Chico, Cal.: "One of the latest proposals in the life of bee culture in this section is that of J. T. Dunn of Chico Vecino who has announced that he will use electricity for the development of queen bees, believing that in this way stronger queens can be secured. Dunn is an expert bee man, who recently came here from San Jose. He believes that Chico is one of the best bee sections in the state. Dunn is well known as a producer of queen bees and says that although he produces large numbers of them he is never able to fill the demand. He sends queens to all parts of the United States and some to foreign countries."

Professor Krauss, agronomist of Hawaii Experiment Station and now a homesteader on the Island of Maui, is quoted in the local press as intimating that the federal government, through its department of agriculture and with the coöperation of the war department, has a program for developing the agricultural resources of the Territory to the limit. This is good news, indicating that the long-desired day of the small farmer in Hawaii is about to dawn. In the meantime the successful continuance of the territorial produce agency, started a year or two ago in Honolulu, is a gratifying fact.

#### JANUARY MEETING OF BOARD.

A regular meeting of the Board of Agriculture and Forestry was held at the office of the president on January 28, those present being President Albert Waterhouse, Commissioners J. M. Dowsett and A. H. Rice; also C. S. Judd, executive officer.

The minutes of the December meeting were read and approved, and the routine reports of divisions were accepted.

#### ANIMAL INDUSTRY.

Regarding recommendation contained in Dr. Norgaard's December report that favorable action be taken in regard to Dr. Elliot's request for assistance in the matter of transportation in carrying on the tuberculin testing of dairy stock in the Hilo district, Hawaii, it was the sense of the meeting that the proposed extension of the work and its attendant expense, including the purchase of a Ford car, be delayed until appropriations are made by the Legislature. President Waterhouse recommended, however, that in the meantime the sum of \$300 be allotted Dr. Elliot for the period of six months ending June 30, 1915, for the purpose above named. Same was made a motion by Mr. Dowsett, seconded by Mr. Rice and unanimously carried.

President Waterhouse called attention to plans and specifications as submitted with Dr. Norgaard's December report for an animal shelter and hospital house at the local quarantine station at an approximate cost of \$200 exclusive of labor. It was there-

upon moved by Mr. Rice, seconded by Mr. Dowsett and unanimously carried that the above sum be allotted for such additional quarters. Those present agreed, however, that this sum be not exceeded, and the executive officer was therefore requested to keep informed as to the progress of the work.

#### REQUEST OF PROF. BRIGHAM.

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The president stated that, as by communication from the Governor dated January 18, 1915, the sum of \$6500 had been allotted out of the revenue derived from water licenses under Act 57, S. L. of 1913, for salaries, payrolls, current expenses, equipment and construction work of the Division of Hydrography for the period ending June 30, 1915.

#### CLAIM AGAINST HILO SUGAR COMPANY.

President Waterhouse stated there was nothing new to report in connection with the claim against the Hilo Sugar Company for \$220 for lumber and iron removed from the premises of the old quarantine station at Punohoa, Hilo, Hawaii.

## ADMISSION OF DOG.

In connection with request of Mr. E. S. Dam of Seattle, Washington, dated December 19, 1914, re the admission of a dog to the Territory of Hawaii without the four months' quarantine required by the local laws, in which instance the matter had been referred to Mr. J. K. Kalaniana'ole, Delegate to Congress, Washington, D. C., President Waterhouse read a letter to Mr. Kalaniana'ole in which the above request was refused, and stated he would like to have his action confirmed. Upon motion of Mr. Dowsett, seconded by Mr. Rice said letter was confirmed. The president also stated that Mr. Dam had been advised that his request could not be granted.

## A. WATERHOUSE COMMISSIONED AS PRESIDENT.

Mr. Waterhouse advised those present that, as by commission from the Governor dated January 3, 1915, he had been commissioned as President of the Board, vice W. M. Giffard, resigned, Mr. Giffard, however, still retaining his commission as commissioner.

## MILK INSPECTION.

A lengthy discussion arose regarding the present status of the milk inspection work and the appointment by the City and County of an unqualified man to act as such inspector. The president advised those present that he felt quite ready to abandon the tuberculosis control work as well as the milk inspection work pending the decision of the Legislature as to whether the milk inspection work would be continued by the County or the Territory. The draft of a letter was thereupon read by the president addressed to the Mayor and Board of Supervisors asking them to reconsider their appointment of Mr. Lot Lane as milk inspector and appoint Mr. Joseph Richard to such position; further stating that unless the personnel of the milk inspector is such that the officers of the board feel has the proper qualifications to act as such inspector, the coöperation previously existing between the Board of Supervisors of the City and County and the Board of Agriculture and Forestry would be discontinued. Upon motion of Commissioner Dowsett, seconded by Commissioner Rice, said letter was confirmed. Regarding the contemplated action of the board that publication be given once a month of the bacterial counts of the local milk supply together with the names of the producers, which matter came up for discussion at the December meeting, those present agreed that it would be advisable to defer same pending the decision of the Mayor and Board of Supervisors.

## DIVISION OF ANIMAL INDUSTRY.

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Honolulu, December 31, 1914.

The Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to report on the work of the Division of Animal Industry for the month ending December 31, 1914, as follows:

## BOVINE TUBERCULOSIS CONTROL WORK.

The testing of dairy and range cattle for tuberculosis came to a close with a few scattering cases of cows tested for transfer from one stable to another. Without wishing to anticipate the total results, as they are now being prepared for the biennial report of this Division, it may be mentioned that the outlook for complete eradication of this dangerous and destructive disease is very promising. On the Island of Oahu alone more than 7000 tests were made, yielding a total of 151 reacting animals, or slightly above two per cent (2.08%). Of these 151 reactors it is known that 113 have been killed, leaving only 38 tuberculous animals, of which number 31 belong to two parties who have them segregated miles away from their respective dairies, while less than half a dozen may be said to be segregated on the dairy premises where they were found, if that can be called segregation. In every case, however, with the possible exception of Geo. Holt's 13 reactors at Maili and Dr. Straub's two Brown Swiss cows (imported stock) retained on his premises, these animals will be killed as soon as they have calved.

The status at the end of 1914 may therefore be summed up as 15 known reactors still alive out of a total of 7231 tested during the year, which compares favorably with the first test made in 1910, which yielded 471 reactors out of 2095 tested (dairy cows whose milk was being sold) and the 1911 test which gave 225 reactors out of 4269 cattle tested.

While the actual figures for the past year have not yet been received from the other islands it is known that the total number of tests will far exceed 10,000 for the Territory, probably 12,000, which must be conceded a highly creditable performance when conditions and cost are considered. No country, state, territory or community ever destroyed ten per cent of its tuberculin tested reacting dairy animals without paying any indemnity to the owners (1300 head killed here from 1910 to 1914 inclusive), nor has such a volume of work (more than 25,000 tests) ever been performed in the same length of time and with an equal force of officers and men, except perhaps where our methods have been adopted. I do therefore not hesitate again to recommend that favorable action be taken on Dr. Elliot's appeal for assistance as

voiced in the enclosed correspondence. As will be seen it is not alone tuberculosis but also hog cholera that require his time and energy, two infectious and contagious diseases, the responsibility for which cannot be avoided by this Board. That glanders has been completely eradicated has to a certain extent diminished the fear of animal epidemics among the owners of large numbers of draft animals, which, in connection with the reduction in the number of these, resulting from the introduction of motor power, has already manifested itself in a considerable reduction in Dr. Elliot's income; and with the prospect of free sugar next year it may be further reduced. While Dr. Elliot mentions his official salary as \$150.00 per month, and considers it satisfactory, it must be borne in mind that the Hilo District is the only one where this official \$100.00 per month salary is still maintained, both Maui and Kauai insisting on lumping said salary with the veterinarians' pay for professional services. With the eradication of glanders in the Islands, there remains only the danger of introducing new cases of glanders with imported stock, for the inspection and quarantining of which the plantations can hardly be expected to pay.

The work now before us, as clearly set forth in Dr. Elliot's letters, consists chiefly in the eradication of tuberculosis and hog cholera, both of which diseases must go if the agriculturist is to make any kind of a success here. Dr. Elliot suggests that a Ford car be furnished him by the Board and its upkeep provided for, the scope of work he proposes to undertake and all of which has my unqualified support and approval, being fully explained in his letters; to which I can only add, that the Island of Hawaii is fortunate in having so able and energetic a district veterinarian, and the Board of Agriculture and Forestry equally so in being so unusually well represented on the big island.

A highly efficient milk inspection service has already been inaugurated in the Hilo district, by Dr. Elliot coöperating with the local Board of Health; in fact no local milk ordinance is in effect there, it being held that the Territorial Board of Health statute provides sufficient authority upon which to base and enforce efficient milk and dairy inspection, while the supervisors are glad to be relieved of this responsibility and expense.

#### THE HONOLULU MILK SUPPLY.

In regard to the action contemplated by the Board at its last meeting, that is, a periodical bacterial count of all milk produced here for human consumption, and the publication of such counts for the information of the milk consuming public, I have to say that the Division of Animal Industry can undertake the work at slight expense for additional apparatus and supplies, say \$10.00 per month. But whether to undertake this work which is strictly a milk inspection feature, required by the local milk ordinance



which stipulates the number of bacteria permissible in commercial milk, will, I take it, depend entirely upon the attitude of the new Board of Supervisors toward this Board, which is already doing, and has been so doing for more than four years, the most arduous work connected with the enforcement of said milk ordinance, that is, the tuberculin testing of all dairy cows. If to this is added the next most difficult work, viz.—the bacterial count, there remains little more to be done that this Division could not assume in conjunction with the sanitary inspectors of the Board of Health and the pure food inspector. If the new Board of Supervisors appoint a competent milk inspector and direct him to cooperate with this Division, that is, if they appoint the *only qualified milk inspector in the country*, Mr. Joe Richard, who, as they are well aware, has been carried on the rolls of this Board for the past two years in order to retain his services and further develop his ability and usefulness, then the milk inspection question is solved, and solved in the most economic manner possible, effecting a considerable cash saving to the Board of Supervisors, at the same time as placing the authority and responsibility under one head. Any other appointment will mean an impediment to the service and a complete disregard of what the public demand and are entitled to, and for which they certainly have been waiting long enough, that is, clean milk from healthy cows. Whatever milk and dairy inspection has been carried on during the past two years has been done by the Division of Animal Industry; every dairyman knows its officers and has confidence in them, and the very idea of an unproficient and inexperienced man attempting to enforce the milk regulations by the rule of thumb or by the printed word of the ordinance would prove either a farce or a tragedy, without getting one step closer to clean milk. But as I have already laid this matter before the President of this Board for his action, I only venture to hope for an equitable solution of the subject, that will not render useless the efforts of the Board and of this Division during the past two years for the end in view—clean milk from healthy cows. However, if the Board of Supervisors should not wish to cooperate with this Board as above suggested, I trust the Board will not require this Division to educate another milk inspector, which task would be equal to assuming the inspection work as hitherto. By the same token I should feel constrained to notify the Board that an ordinarily intelligent laborer will be sufficiently qualified to perform the duties required of a lay assistant in carrying on the tuberculin testing work, and that \$35.00 or \$40.00 per month may thereby be saved. However as Supervisor Mr. Dan Logan, who three years ago helped this Division by having the then city milk inspector, Mr. Richard, assigned to assist us in the cattle testing, which work in every way coincides and fits in with the milk and dairy inspection work, has now promised to lend his influence toward a similar arrangement, the two Boards dividing expenses,—salary and transportation,

—it would seem that a saving of at least \$50.00 per month for each Board would be welcomed under the present financial stringency, while duplication of work and, more than everything else, the increased cost of transportation be avoided.

#### ANIMAL QUARANTINE STATION.

I beg to transmit herewith plans and specifications for an animal shelter and hospital house such as has been contemplated ever since the endemic of last year, which resulted in the loss of nearly a dozen quarantined dogs. The inclement weather of the past month has made it imperative that such a house be provided for the protection and care of sick, delicate or otherwise susceptible animals, as well as for the safeguarding of valuable dogs during the night. The estimated cost of this house, with lockers for eight small dogs and five medium sized dogs, would amount to about \$200 exclusive of labor. It is however thought that the keeper and his assistant will be able to erect the house when there is nothing else to do, the same as they built the living rooms that were added to the keeper's cottage last year, especially so long as the lockers are made up at the planing mill.

On Dec. 30th, at 1:30 a. m., a whirlwind passed through the central part of the station, demolishing one of the largest feed and shelter racks and uprooting some algaroba trees (see pictures appended). Had this "twister" passed through the dog enclosure considerable damage would undoubtedly have resulted, both to buildings and animals. As it was several dozen corrugated iron sheets were torn from the rafters and purline and scattered all over the station, some of the sheets being recovered from the Ala Moana Road, where they barely missed injuring belated soldiers returning to Fort De Russy, while others were carried clear beyond the beach. These twisted sheets have been straightened and can nearly all be used again. The total damage is estimated at \$8.00 for lumber and lead head spikes and two or three sheets of iron.

Respectfully submitted,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

#### REPORT OF ASSISTANT VETERINARIAN.

Honolulu, December 31, 1914.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit herewith my report for December, 1914, as follows:

*Tuberculosis Control.*

The work in this line was confined to the testing and examination of one cow for Mr. J. H. Cummings.

A post-mortem was made on a grade Jersey heifer condemned at Waialae Ranch November 13, 1914. *Lesions:* Right retro-pharyngeal lymph gland greatly enlarged and filled with tubercles the size of lead shot. No other lesions were discovered.

The annual test for 1914 has been brought to a close and the results, as a whole, are exceedingly gratifying. The total number of tests made during the year amounts to 7231, which is over two thousand more than last year. Out of this number 151 head have been condemned and branded, and of these more than one hundred have been slaughtered, while the remaining ones are segregated and are being slaughtered as rapidly as possible.

The percentage of diseased animals found in the dairy herds during the year 1914 is 2.08%, which is a reduction of 1.81%, or almost one-half of the amount of disease found in 1913 which must be considered a long step toward the goal of total eradication.

## IMPORTATION OF LIVE STOCK.

Manoa, San Francisco: 1 Berkshire cow, E. O. Hall & Son;  
2 Angora goats, F. P. Johnson; 1 dog, Sergt. T. H. Matthews.  
Sonoma, Sydney: 50 Merino rams, Parker Ranch.

Matsonia, San Francisco: 28 crates poultry.

China, San Francisco: 5 crates turkeys, Hind, Rolph & Co.

Hyades, Seattle: 1 crate poultry, E. W. Jordan.

Sierra, San Francisco: 2 crates poultry, K. & M.; 1 crate rabbits, 1 black cat, W. F. X. Co.; 1 crate pigeons, Mr. Lambert.

Lurline, San Francisco: 2 Berkshire boars, E. O. Hall & Son;  
4 crates poultry, Chong Mon; 2 crates poultry, Dr. A. G. Hodgins;  
1 Jersey bull, D. P. R. Isenberg; 1 horse, K. Miyahara;  
1 horse, 1 Holstein bull, 34 mules, Schuman Carriage Company;  
10 crates poultry, L. K. Smith.

Manchuria, San Francisco: 1 dog, Geo. I. Van Ness.

Wilhelmina, San Francisco: 2 crates rabbits, U. S. Experiment Station; 57 crates poultry.

Hilonian, Seattle: 50 Merino rams, 10 Shropshire rams, 2 Berkshire boars, Parker Ranch.

Mongolia, Orient: 1 crate poultry, J.

Shinyo Maru, Yokohama: 4 crates poultry, K. Machida.

Manoa, San Francisco: 29 crates poultry.

Niagara, Vancouver: 1 dog, Mrs. E. L. Tindall.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

## DIVISION OF ENTOMOLOGY.

Honolulu, December 31, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of December, 1914, as follows:

During this month 42 vessels arrived at the port of Honolulu of which 23 vessels carried vegetable matter and two vessels sand.

<i>Disposal.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	1,311	29,851
Fumigated . . . . .	9	1,393
Burned . . . . .	49	114
Returned . . . . .	6	138
Total inspected.....	1,375	31,496

Of these shipments 31,259 packages arrived as freight, 119 packages through the postoffice, and 118 packages as baggage of passengers and immigrants.

## RICE AND BEAN SHIPMENTS.

During the month 8287 bags of rice and 3152 bags of beans arrived from Japan which after careful inspection were found free from pests and were passed for delivery.

## PESTS INTERCEPTED.

Thirty-three packages of fruit and eight packages of vegetables were found in the baggage of passengers and immigrants from foreign countries. These were seized and destroyed by burning. 137 crates of Tangerines from Japan via Seattle and San Francisco were ordered returned to the shipper. These shipments came on the S. S. Wilhelmina December 22nd and the S. S. Manoa December 26th. As no fruit from Oriental ports directly or indirectly is permitted to land under Rule 1 of the Board of Agriculture and Forestry, I gave the consignees the option of either returning them to the shipper or of burning them. It may be interesting to note that after January 1, 1915, no citrus nursery stock, including buds, scions and seeds, can be imported into the United States or its Territories from foreign countries, under Notice of Quarantine No. 19 of the Federal Horticultural Board of the United States Department of Agriculture. This is owing to a dangerous disease of citrus plants known as the *Citrus Canker*.

Two packages of mistletoe from California had to be fumigated before delivery on account of being infected with the greedy scale (*Aspidiotus rapax*). In a small package of sunflower seed from Portugal one seed contained the larva of a *Tortricid* moth.

The following insects and other creatures were found in the packing and leaves of some birdnest ferns which were included in a shipment of orchids from Manila, P. I., on December 22:

*Beetles*: Four species of *Carabidae*, three species of *Staphylinidae*, one *Pselaphid*, one *Tenebrionid* and larva, one *Calandra oryzae*, one *Clarid*, one *Silvanus surinamensis* and one crushed beetle showing only wings. One Decay fly (*Drosophila* species), one *Reduvius* bug, four large slugs—*Verenacella* species with eggs. Several spiders, centipede, hilepods, pillbugs (*Oniscus* species). Two species of ants (*Iridomyrmex guinonae* and *Ponera* species), one house lizard (*Cooko* species) and three species of snails (2 *Kaliolla* species and 1 *Opesa* species). After fumigating the shipment thoroughly and going over each orchid they were passed, but all the ferns and packing were destroyed by burning. One lot of pine tree seeds from Japan was returned to the sender under the Federal Horticultural Board ruling that no plants or seeds shall be admitted into the United States or its Territories from foreign countries through the mails.

#### BENEFICIAL INSECTS.

Mr. D. T. Fullaway has continued with the breeding of the newly introduced parasites. During the month 7575 parasites were liberated in various places as reported by Mr. Fullaway in his report appended herewith.

#### HILO INSPECTION.

Brother M. Newell reports the arrival of nine steamers and one sailing vessel. Five steamers brought vegetable matter consisting of 192 lots and 3537 packages which were free from pests and were passed for delivery. The sailing vessel had lumber.

#### INTER-ISLAND INSPECTION.

During the month of December 67 steamers were attended to and the following shipments were inspected and passed:

Plants . . . . .	68	packages
Taro . . . . .	736	"
Vegetables . . . . .	32	"
Fruit . . . . .	3	"
<hr/>		
Inspected and passed . . . . .	839	"

The following packages were refused shipment on account of infestation or of having undesirable soil attached to the plants:

Plants . . . . .	9	packages
Fruit . . . . .	8	"
Vegetables . . . . .	1	"
<hr/>		
Refused shipment . . . . .	18	"

Respectfully submitted,

EDWARD M. EHRHORN,  
Superintendent of Entomology.

#### FRUITFLY CONTROL.

Honolulu, December 31, 1914.

E. M. Ehrhorn, Esq., Superintendent of Entomology.

Dear Sir:—Permit me to report that at the close of the month of December all the parasites being handled in the insectary were doing well and no further losses have occurred. During the month we have produced the following numbers:

*Diachasma fullawayi*—69 females, 200 males.

*Diachasma tryoni*—4 females, 11 males.

*Tetrastichus giffardii*—6845.

*Spalangia* sp. —3.

Of these we have liberated as follows:

*Diachasma fullawayi* under tents—10 females with accompanying males in coffee fields at Maunawili Ranch, Oahu.

25 females and accompanying males in the coffee fields in Kona, Hawaii, in three separate one-fourth acre areas at Honaunau, Kealahakua and Holualoa respectively, the coffee on these areas being left on the tree unpicked.

*Tetrastichus*—500 liberated at Judge Cooper's, Manoa; 600 liberated on Mr. Damon's Moanalua Est.; 200 liberated at Maunawili; 200 liberated at Pearl City; 300 liberated at Kealahakua, Kona, Hawaii; 300 liberated at Honaunau, Kona, Hawaii; 300 liberated at Holualoa, Kona, Hawaii.

*Opius humilis*—250 liberated on Pacific Heights; 50 liberated at Pearl City.

*Galesus*—500 liberated on Gartley's Nuuanu property; 100 liberated at Pearl City.

The conspicuous feature of the work during this month was the retardation in development of the parasites due to the low temperatures experienced for about ten days in the middle of the month. This was felt at the time to be quite serious, but fortunately no harm has resulted and the emergencies which have taken place since have been larger than was expected.

The indications seem to be that the *Spalangia* brought from

West Africa is a true fruitfly parasite, and while on account of its slow development and low rate of parasitism it has been impossible to secure numbers large enough to warrant liberation in the open, it is felt that later on when our attention can be given exclusively to this insect, it will be possible to multiply it in large numbers, and everything going well, to get it established. While it evidently is a slow worker its attachment to the fruitfly alone makes it, in the writer's opinion, an extremely valuable parasite, and one that ought by all means to be established here if possible.

Very truly yours,

DAVID T. FULLAWAY.

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DIVISION OF FORESTRY.

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Honolulu, December 31, 1914.

Albert Waterhouse, Esq.,  
Acting President and Executive Officer,  
Board of Agriculture and Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of December, 1914:

NURSERY.

*Distribution of Plants.*

	In seed boxes.	In boxes trans- planted.	Pot Grown.	Total.
Sold . . . . .	.....	.....	40	40
Gratis . . . . .	500	1150	1698	3348
	<hr/> 500	<hr/> 1150	<hr/> 1738	<hr/> 3388

COLLECTIONS.

*Government Realizations.*

Collected on account of plants sold.....	\$ .80
Rent of building, nursery grounds.....	35.00
	<hr/> \$35.80

*Preservation of Forest Reserves.*

On account of rent of premises Half Way House, Tantalus, for the months of Sept., Oct., Nov. and Dec., at \$10 a month .....	\$40.00
For the use of two acres of land, Pauoa Valley, at \$10 per acre per year, for Oct., Nov. and Dec.....	5.00
For use of land and gathering ti leaf, Pauoa Valley, \$50 per year, for Oct., Nov. and Dec.....	12.50
	<hr/>
Deposited with the Territorial Treasurer as a special fund and for the use of the Division of Forestry.....	\$57.50

## PLANTATION COMPANIES AND OTHER CORPORATIONS.

The distribution during the month amounted to 20,000 seedlings and 500 assorted pot grown plants.

## MAKIKI STATION.

The work has been principally routine in connection with the propagating and transplanting of trees. Our stock is considerably reduced and will require several months to get it up again.

## HONOLULU WATER SHED PLANTING.

During the month 533 Koa and 125 Kukui trees were planted out. Other work done consisted of clearing off, making holes and hoeing.

## ADVICE AND ASSISTANCE.

On December 17 the writer visited Water Reserve R at Pu-pukea and made arrangements with Mr. Mark Robinson, Jr., in regard to planting the tract with ironwood trees.

The trees are now ready at our Makiki station and will be forwarded when required.

At the request of a number of people in and around the city the writer has paid visits and given advice otherwise. The following gives the number of persons who have asked for advice and assistance: Visits made in and around the city, 12; by telephone, 14; by letter, other islands, 4; calling at nursery, 16; total, 46.

Very respectfully,

DAVID HAUGHS,  
Forest Nurseryman.



## DIVISION OF HYDROGRAPHY.

Honolulu, January 22, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operation of the Division of Hydrography during December, 1914, is submitted:

## RAINFALL.

Dry weather continued during the month and with the exception of a large flood on windward Kauai on December 2 and 3d, which was the largest of the year, December was generally one of the driest months of the year. Partial rainfall records for the year seem to indicate that September was one of, if not, the wettest month on record in the Territory. Unfortunately shortage of funds caused the discontinuance of practically all of the high mountain rain gages, so that only fragmentary records are available. A few complete records are available at this time, and many others will be received in the near future. On Oahu the following total 1914 records are interesting:

Nuuanu Pali gage, elevation 1200 feet.....	140 inches.
Wahiawa, mauka, elevation 1250 feet.....	218 "
Wahiawa, makai, elevation 900 feet.....	41.2 "
Waianae at Makaha, elevation 1300 feet....	74.3 "

## DITCH SEEPAGE INVESTIGATION.

The ditch efficiency investigation made at the sub-station of the H. S. P. A. Experimental Station, was completed and a report of the results obtained was forwarded to the Director of the Hawaiian Sugar Planters' Association Experimental Station on December 2, 1914. Additional investigation work of this nature was done in coöperation with the Hawi Plantation & Mill Co., and with the Kohala Ditch Co. on Hawaii. Copies of these reports are attached hereto. The coöperative investigation work with those plantations which have signified a desire for this work, will be started in January, 1915, and will include during the year the following plantations:

*Oahu*—Waialua Agricultural Co., Oahu Sugar Company, Ewa Plantation Co., and Honolulu Plantation Co.

*Maui*—Maui Agricultural Co., and Pioneer Mill Co.

*Kauai*—Kekaha Sugar Co.

It is considered probable that other plantations will take advantage of this work during 1915.

## PUBLICATION OF DATA.

Approval has been received from the Director of the U. S. Geological Survey for the substitution of the *million gallon per 24 hours* unit in place of the *cubic foot per second* unit in all reports relative to Hawaiian water data. Future Hawaiian annual reports will cover fiscal years ending June 30, instead of covering calendar years as in the past. In order to make this substitution, no report will be issued for the calendar year 1914, but a biennial report for the period July 1, 1913, to June 30, 1915, will be issued. In the meanwhile, however, the past practice of furnishing blue print copies of data and information to all interested parties will be continued.

## ENGINEERS CONFERENCE AT WASHINGTON, D. C.

The Superintendent attended and participated in the conference of engineers of the U. S. Geological Survey held at Washington, D. C., December 7 to 20th, 1914. At this conference the many conditions to be encountered, the best equipment to be used, and the most efficient methods to be employed on hydrometric investigation work, were discussed and many valuable papers were read covering these subjects. A number of the papers and discussions will be printed for preservation and distribution. The conference was attended by practically all of the hydrometric experts of both the United States and Canada, and by representatives of the three most important manufacturers of hydraulic investigation equipment. The representatives exhibited models of the latest and most improved instruments, etc. Addresses were made to the conference by the Secretary of the Interior, the Director of the U. S. Geological Survey, the Director of the Reclamation Service, and other prominent officials and hydraulic engineers and experts.

## CHIEF HYDRAULIC ENGINEER, U. S. G. S.

The Chief Hydraulic Engineer of the U. S. Geological Survey received authority to visit this Territory, inspect the work done up to the present, and to confer with territorial officials relative to their desires as to the future policy and procedure of the work. It is expected that Mr. Grover will arrive about March 13th and remain in the islands until about May 5th. The entire expenses of this visit will be paid from a federal fund maintained for that purpose.

## KAPAA HOMESTEAD WATER SUPPLY.

A reconnaissance was made of the Kapaa River on Kauai to determine the best location of proposed measurement stations to accurately determine the discharge of these two principal

branches of the river at points at or near the forest reserve line, and above all homesteads. Measurements made after a dry period of three weeks showed a discharge of about twelve million gallons per 24 hours.

#### KAUAI.

The entire month was spent on general improvement and measurement work. The defects of the 700-foot level windward stream stations which were uncovered by the recent floods, were rectified and a large amount of boulders and other materials with which the floods had choked the measurement sections was removed. Sixteen stream discharge measurements were made and nine rainfall stations were visited.

Conferences were held with the Manager of the Hawaiian Sugar Co. and with the President of the Lihue Plantation Co., and these officials agreed to maintain and operate all measurement stations within their respective jurisdictions in the future without cost to the government.

#### OAHU.

Forty stream measurements were made and two rain gaging stations were visited. The greater part of the month was spent by all employees in the Honolulu office in the preparation of data and reports. The station maintained by the Waiahole Water Co. above the north portal power house was discontinued as having served its purpose. Four measurements made at the station below the power house declared the fact that the tunnel discharge has remained practically constant for the past three months, at about 33 million gallons per day.

#### KAUAI.

Only routine operation work was done. All continuous water stage register stations were visited, instruments were inspected, and records secured. Two rainfall measurement stations were visited and the rainfall measurement station at Iao cave, elevation 1720 feet, was discontinued, as the records from this station have been almost identical with those obtained in the Iao tableland, elevation 1500 feet.

#### HAWAII.

Mr. C. T. Bailey, Acting Superintendent, spent December 3 to 7 on Hawaii, collecting data for the use of the Attorney-General to be used as evidence in the Hilo Boarding School ditch case.

## KONA INVESTIGATION.

The report of the special investigation of North and South Kona for which the 1913 Legislature appropriated \$5,000.00 has been completed, and will be printed in January.

## JANUARY PLANS.

*Kauai.*

The measurement station to be installed on the Olokele River in coöperation with the Hawaiian Sugar Co. will probably be completed. Should authority be received for the installation of the proposed Kapaa River measurement stations above the home-stead trails, this work will probably be started. Routine gaging and maintenance work will be carried on as usual.

*Oahu.*

The special seepage and utilization investigation of the Wai-alua Agricultural Co. will be started, and plans will be developed for coöperative investigation work in connection with the Wai-ahole Tunnel Project and the Oahu Sugar Co. 1914 Hydro-metric data will be collected and prepared for publication and issued to those interested.

*Maui.*

Only operation and maintenance work will be done.

## HAWAII.

Mr. C. T. Bailey, Assistant Engineer, will continue investigation work, and will appear as a witness for the government in connection with the Hilo Boarding School ditch case which will be heard at Hilo during January.

Very respectfully,

L. K. LARRISON,  
Superintendent of Hydrography.

It is estimated that the government's Grand Canyon game refuge, in Arizona, now contains about ten thousand deer.

More than nine million young trees and ten thousand pounds of seed were planted on the national forests in 1914.

The government built more than two thousand miles of trail and three thousand miles of telephone line on the national forests in 1914.

## FORESTRY AT PANAMA-PACIFIC EXPOSITION.

The forestry and forest products exhibit at the Panama-Pacific International Exposition will be shown in the Palace of Agriculture, which, with the exception of the great Palace of Machinery, is the largest exhibit palace of the exposition. The Palace of Agriculture covers an area of 328,633 square feet and was erected at a cost of \$425,610.

Group 134, under the official classification of exhibits, is divided into four classes of forestry exhibits comprising forest geography, maps, statistics and general literature, geographical distribution, botanical collections, seeds, bark, foliage, flowers, fruit, bark and wood sections. The planting, equipment and processes for tree collection, nursery practice, field planting and field sowing, make up class 661. Management and utilization, equipment and processes for protection from fire, insects and disease, organization of protective forces, ranger stations, trail and telephone systems, logging methods and equipment, transportation of logs and systems of cutting, comprise another.

The indirect use of forests, such as watershed protection, effects on climate and public health, prevention of erosion and shifting sand, use of windbreaks for recreation or as a refuge for game, is all considered in a separate class.

Forest products are exemplified in three classes: Lumber, equipment and processes used in cutting lumber logs into lumber, drying, dressing and grading of lumber and the rules for grading; saw-mill and planing-mill products for the manufacture of lumber; wagon-stock, cooperage, boxes, pickets, shingles, and doors. Veneering and veneering-cutting machinery will also be shown. Forest by-products—tanbark and extracts, naval stores, oils and distillates, charcoal, cork, dye-woods, medicinal and textile barks, kiln-dried wood, wood fuels and wood wool, occupy another class.

At least 25 per cent of the larch timber over large areas in eastern Oregon has been killed or weakened by mistletoe, and the forest service is taking steps to combat the pest.

Success has followed forest planting on the sandhills of Nebraska. Jack pines planted there by the government forest service ten years ago now have a height of over 15 feet and a diameter of 4 inches.

Increasing use of the national forests by local farmers and settlers to supply their needs for timber is shown in the fact that small timber sales on the forests numbered 8298 in 1914, against 6182 the previous year.

Osage orange wood is a source of dye and can be used to supplement the imported fustic wood, as a permanent yellow for textiles.

News print paper has been made by the forest service laboratory from 24 different woods, and a number compare favorably with standard spruce pulp paper.

The forest service is cooperating with 54 railroads, mining companies, pole companies, and cities in making tests of wooden ties, timbers, poles, piling, and paving blocks which have been given preservative treatment.

Recent sales by the government totaling 126,000,000 feet of sawtimber in the Olympic national forest, in western Washington, mark the opening of this hitherto inaccessible storehouse of timber, estimated to contain a stand of 33 billion board feet.

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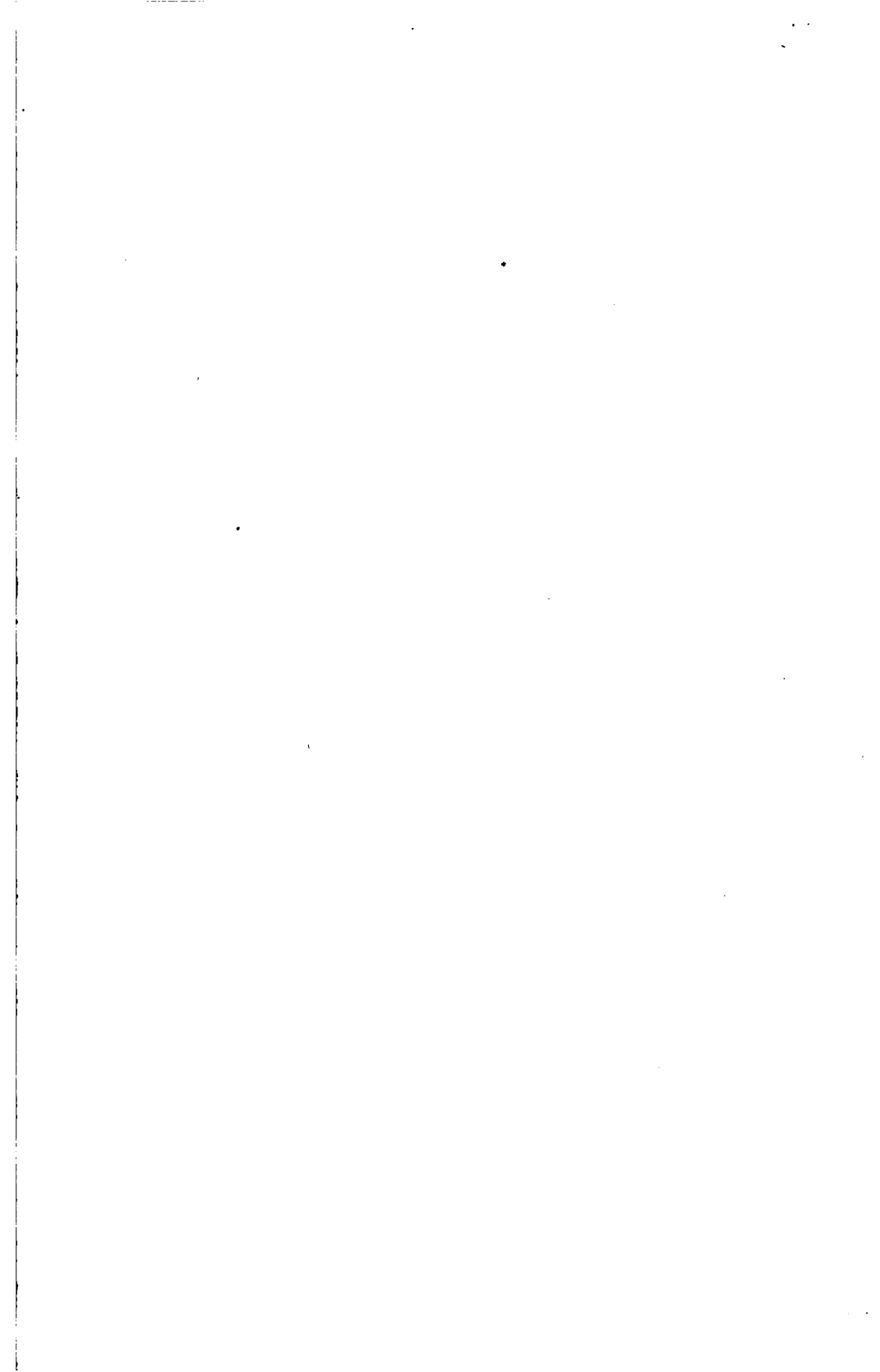
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# Board of Agriculture and Forestry

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The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

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## DIVISION OF HYDROGRAPHY.

Rooms 20-22 Kapiolani Bldg. Tel. No. 3662.

The Division of Hydrography has on hand free publications relative to the water resources of the Hawaiian Islands. These publications furnish detailed data as to daily, monthly, mean, maximum, and minimum run-off of streams and ditches, and also cuts and maps pertaining to the different islands. Much descriptive data relative to the mountain ranges and physical configuration of each island are also contained. These publications will be mailed free of charge on request.

The United States Geological Survey topographic map of Kauai is also on sale, and copies will be mailed on receipt of 50 cents.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

This division will also make ditch seepage losses and utilization investigations when the actual cost of the labor, materials, subsistence, transportation, etc., of such investigations is paid by those benefited.

G. K. LARRISON,  
Superintendent of Hydrography.

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**DANIEL LOGAN,  
EDITOR "THE FORESTER,"**

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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

**DAVID HAUGHS,**  
Acting Superintendent of Forestry.

### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wood box specimens may be mailed by parcels post. When specimens not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications to  
**SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX  
HONOLULU, HAWAII.**

**EDW. M. EHRHORN**  
Superintendent

# THE HAWAIIAN FORESTER & AGRICULTURIST

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## FERNS OF HAWAII.

In the Philippine Journal of Science (Vol. IX, No. 5) appears a seven-page article entitled, "Hawaiian Ferns Collected by M. L'Abbé U. Faurie," by Edwin Bingham Copeland (from the College of Agriculture, University of the Philippines, Los Baños, P. I.). In his opening remarks the author states that, more than three years ago, M. Abbé Faurie placed in his hands a remarkably complete collection of the ferns of Hawaii, which he made during the years 1909 and 1910. In the course of the article the author mentions his having consulted the Brackenridge volume in the Bishop Museum, and says that Hawaiian ferns are represented in very considerable number in the herbarium of the Philippine bureau of science and in his own herbarium. "These specimens go back to collectors as old as Gaudichaud," Prof. Copeland says, "and include a considerable number collected and determined himself." Besides the plants he had himself collected on two personal visits to the mountains near Honolulu, he makes acknowledgments for specimens to the Bishop Museum, H. M. Curran (formerly of the Philippine forestry bureau), Dr. Bartsch of the United States bureau of fisheries and to the Hawaiian board of forestry. "In the older collections," the author says, "I have fortunately had an especially large representation of species of *Asplenium*, sent to me by the courtesy of the Royal Botanic Garden at Berlin."

In the Faurie collection, it is stated, there appear three cosmopolitan ferns not hitherto collected in Hawaii. These are: *Athyrium Esculentum* (Retz.) Copel., Kauai; *Adiantum Cuneatum*, L. & F., Faurie No. 154, Kauai, Kealia; *Pteris Longifolia* L., Faurie No. 45, Maui, Wailuku.

In descriptions of new species, with "the other changes of name which seem to be called for," the following designations appear: *Athyrium Marginale* (Hilleb.) Copel. comb. nov.; *Athyrium Mauianum* Copel. sp. nov.; *Athyrium Kaalaanum* Copel. sp. nov.; *Sadleria Faurici* Copel. sp. nov.; *Asplenium Polyodon*

Forst.; *Asplenium Cookii* Copel. sp. nov.; *Asplenium Sectum* (Hilleb.) Copel. comb. nov.; *Asplenium Mirabile* Copel. sp. nov.; *Asplenium Nephrolephyllum* Copel. nom. nov.; *Elaphoglossum Crassicaule* Copel. sp. nov.; and *Lindsaya Macraeana* (H. & A.) Copel. comb. nov.

Prof. Copeland mentions, besides Hillebrand's "Flora of Hawaii," a recent publication on Hawaiian ferns by W. J. Robinson. The following extracts from the treatise under review should be of local interest:

"The ferns of the Hawaiian Islands have probably received from Doctor W. J. Hillebrand more careful study than any man has ever given to those of any other limited area in the tropics. Lying as they do on a main route of the world's travel, the Hawaiian Islands have from early times been visited by many collectors, and for this reason, as well as because of the long sojourn of Doctor Hillebrand in the islands, their ferns are particularly well known. On the one hand, the admirable descriptions in Doctor Hillebrand's Flora make the study of these ferns easier than they would be if they came from almost any other part of the tropics. On the other hand, the ferns of Hawaii constitute in themselves a group of phenomenal difficulty. The isolated position of the Archipelago has resulted, in several genera, in the development of a flora altogether peculiar and local. Thus in the ferns, we have two genera, *Diellia* and *Sadleria*, each with a considerable number of species which have unquestionably been developed locally from a common ancestor. In both cases, the ancestor can be fixed with a considerable measure of certainty and exactness.

"The local development of a series of forms, which has taken place in the two genera just mentioned, has taken place also in the large genus *Asplenium*, apparently from a number of immigrant ancestral forms, and with the result that the derived groups have developed until they overlap, and the differentiation of groups, and the assignment of species and forms to the different groups, is only possible to a person who has something like the complete knowledge of the flora which Doctor Hillebrand possessed.

"In both *Asplenium* and *Sadleria*, I have ventured to describe new species, and in *Asplenium* I have raised some of his forms to specific rank. The most of the species which I describe as new in this paper are, I believe, plants which Doctor Hillebrand had not seen. It must be remarked that the Abbé Faurie is himself a collector of very long experience, that he is a good student of ferns, and that he devoted himself for about a year and a half wholly to the collection of the Hawaiian plants. Even in a land where the ferns have been as well studied as in Hawaii, it would be very strange if the Abbé Faurie had not succeeded in finding a number of previously unknown plants. In fact, knowing as I



do the work of Abbé Faurie, I consider the small number of new species which I can find in this collection almost as strong a testimonial as is Hillebrand's own work to the thoroughness with which Doctor Hillebrand has covered his field. Almost all of the species described by Doctor Hillebrand, and a wide range of forms which are not treated as species, are found in the Faurie collection."

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## TROPICAL PRODUCTS AS FOODSTUFFS.

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Tropical Life (Londonā, discussing the European food situation created by the war, offers the following remarks:

"We are no believers in 'crank' foods, but it is no crank statement to say that, weight for weight, much nourishment can be obtained from sweet-potato flour, banana flour, and other fruits and vegetables produced in the tropics. The Rubber Growers' Association have been giving substantial money prizes to the man who can invent fresh demands for raw rubber on a large scale. Napoleon offered and, we believe, gave a big prize to the man who produced sugar from a source other than cane, viz., beet. Think, therefore, what a reward should be given to those who can come forward at times like the present and show us in Europe how to cheaply feed the million. Long before the last shot of this conflagration has been fired we may realize the mistake of being so dependent on other European countries, even for such things as eggs, bacon, butter (animal and vegetable), etc., whilst even eggs can nowadays be kept in the cold chamber for weeks, and so certainly for a sufficient number of days to enable them to be produced in huge quantities in the tropics and brought over here for consumption. This being so, why not do it? Compared to bread, the above may be semi-luxuries, but they are necessities too, and the supplies cannot be allowed to stop through war in these days of huge populations packed in small areas. Germany, we believe, is already exporting tons of palm-oil butter for human consumption, whilst the edible products she now manufactures from tropical raw materials, especially copra, are enormous; those from copra must equal if they do not exceed those of France. According to *The Financist* for July, Germany imported last year 195,000 tons of copra, against 45,000 tons only in 1906. This, therefore, shows an increase of 430 per cent in eight years; and if France has not increased latterly at the same rate that Germany has, it is only because she imported such huge quantities, comparatively speaking, before. In 1906 she took 128,000 tons; in 1912, 178,000; whilst last year her total has increased, but we have not the figures by us, and answers to our letters asking for them are not yet to hand. Imagine, therefore, the plight the households of the European middle and lower classes will soon

be in when, already pinched for money, they are further deprived of cereals, eggs, butter, etc., because of their inability to import supplies, to secure men to work the factories and of the reduced spending capacity of themselves; and although coco-nut butter is but one of several foods, it is important to keep up the supplies of this as well as of all foodstuffs."

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In its January issue the Agricultural News (W. I.) gives a synopsis of Bulletin No. 47 of the Hawaiian Agricultural Experiment Station, on cold storage for tropical fruits.

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"Hog Cholera Questions and Answers" is the title of Circular 54 of the agricultural experiment station of the University of Wisconsin. In a prefatory digest it is stated that the State of Wisconsin manufactures hog cholera serum to save her farmers from heavy losses, and the answer to the first question says that hog cholera is "the most dreaded scourge and reaps the greatest toll of any disease affecting domestic animals in this country to-day."

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Attention is called to the announcement of his policy by the new superintendent of forestry, Mr. C. S. Judd, in this number.

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Good work in all divisions is shown in the monthly reports printed in this number.

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## FEBRUARY BOARD MEETING.

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The Board of Agriculture and Forestry met at the office of Mr. J. M. Dowsett at 11 o'clock a. m., February 26, those present being President Albert Waterhouse, Commissioners J. M. Dowsett, A. H. Rice and H. M. von Holt; also Executive Officer C. S. Judd.

Upon motion of Commissioner von Holt, seconded by Commissioner Rice, the routine reports from the Divisions of Forestry, Hydrography, Entomology and Animal Industry for the month of January, 1915, were accepted and ordered filed.

### LETTER TO CITY AND COUNTY OFFICIALS RE WEATHER CONDITIONS.

Commissioner von Holt called especial attention to that portion of the routine report from the Superintendent of Hydrography relating to weather conditions, the small amount of rainfall during the month of January and the possibility of a shortage of water, and suggesting that same be called to the attention of the City and County officials as head of the water department. Those

present concurred, whereupon same was made a motion by Commissioner von Holt, seconded by Commissioner Rice and unanimously carried, and the executive officer directed so to do.

#### STUDY OF HAWAII'S WOOD REQUIREMENTS.

Chairman Waterhouse called to the attention of those present a recommendation contained in the report of the Superintendent of Forestry relating to Hawaii's wood requirements, the executive officer stating in brief that the demand for fuel wood in the Territory is so great and the supply so limited he thought every effort should be made to increase the supply by the encouragement of tree planting on unoccupied waste lands. His idea was to make a study of the annual consumption of fuel wood as well as the present source of supply with a view to later on having the data printed, the U. S. Forest Service having advised that they were willing to cooperate with the Board in every possible way. After a short discussion Commissioner von Holt moved that it be the policy of the Board to carry out the recommendations as contained in the January report of the Superintendent of Forestry under the head of "A Study of Hawaii's Wood Requirements"; same was seconded by Commissioner Rice and unanimously carried.

#### SPECIAL REPORT SUPERINTENDENT OF HYDROGRAPHY.

Regarding the special report from the Superintendent of Hydrography dated January 21, 1915, pending since the January meeting, in which it was recommended that the Commissioner of Public Lands be requested to have inserted in all future water and land leases certain data in order that a continuous record of flow and surface fluctuations of all streams, springs, etc., may be secured, Chairman Waterhouse requested further time to investigate the matter as he desired to take same up with the Governor and the Land Board.

#### RE ALLOTMENT OF \$700 FOR KAPAA STREAM, KAUAI.

Chairman Waterhouse advised that as per letter from the Governor dated February 25, 1915, he had approved of an allotment of \$700 for the purpose of covering the equipment and expenses incident to the installation of stream gaging stations to be established on the two main branches of the Kapaa stream, Kauai, by the Division of Hydrography during the six months period ending June 30, 1915.

## APPLICATION T. M. BURRELL.

The chairman presented a special report from the Superintendent of Forestry dated February 24, 1915, regarding a verbal request which had been received from T. M. Burrell for permission to erect at the Nuuanu Pali, Honolulu Watershed forest reserve, a building which he desires to use as a store, the superintendent recommending that said request be not granted. After more or less discussion and those present concurring that a building at this point would be of detriment and would greatly detract from the natural beauty of the Pali, upon motion of Commissioner Dowsett, seconded by Commissioner von Holt and unanimously carried, Mr. Burrell's request was not granted.

RE INCLUSION OF 298 ACRES OF LAND AT KAPAPALA, KAU, HAWAII,  
IN FOREST RESERVE.

Regarding a special report from the Superintendent of Forestry dated February 24, 1915, with which was submitted a communication from Messrs. C. Brewer & Company, dated February 2, 1915, recommending that a piece of land at Kapapala, Kau, Hawaii, between the mauka boundary of the cane land and the makai boundary of the present forest reserve, containing 298 acres, be taken into the Kau forest reserve; after considerable discussion the Commissioners unanimously approved of the general principle of creating as woodlot reserves unoccupied pieces of waste land which are not needed for homesteading nor for grazing purposes, as recommended in the Superintendent's report, but, regarding the inclusion of the 298 acres in the Kau forest reserve, it was unanimously voted upon motion of Commissioner von Holt, seconded by Commissioner Dowsett, that the Superintendent of Forestry be requested to make an investigation and forward a report as to the advisability of including this area in the reserve.

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Fly larvae in horse manure may be effectively and economically destroyed by the use of commercial borax. According to Bulletin No. 118 of the Bureau of Entomology, United States Department of Agriculture, the application of 0.62 lb. of borax to each 10 cubic feet of horse manure was found to kill eggs and larvae, and it was also found that in the case of many crops the addition of this amount of borax was not detrimental when the manure was applied to the land. In order to prevent the hatching of the eggs, the borax should be applied to the horse manure immediately it is removed from the stable. The maggots congregate about the edge of the manure pile, and on this account most of the borax should be applied in this situation.—*Agricultural News*.

## DIVISION OF ANIMAL INDUSTRY.

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Honolulu, January 31, 1915.Board of Commissioners of Agriculture and Forestry, Honolulu,  
T. H.

Gentlemen:—I beg to report on the work of the Division of Animal Industry for the month of January as follows:

## TUBERCULOSIS CONTROL WORK.

The regular annual test for 1915 began by the injection of a large herd of cattle never before subjected to the test and which it had for a long time seemed desirable to include in the regularly tested herds, as it was well known that the disease was prevalent not only among the milch cows but in the entire herd. While this herd includes 325 head it cannot be considered a regular dairy herd as no milk is sold and, consequently, no license required, but nevertheless a number of families, both in the vicinity of Kualoa and in Honolulu, obtain their milch cows from this ranch.

The results of the first test showed conclusively the necessity for universal testing if total eradication of tuberculosis is to be accomplished, as nearly ten per cent of this herd gave typical reactions. As much of the milk from these animals is consumed by children there was every reason why the diseased animals should be eliminated.

As will be seen from the appended report of Dr. Case, the postmortem examination of eight of the reacting animals showed the disease in more or less advanced stages, three of them being affected to such an extent that it was necessary to condemn the entire carcass as unfit for human consumption. One of these totally condemned cows was suffering from tuberculosis of the udder.

In regard to the test of the Waialae herd, where every effort is being made to eradicate the disease, the percentage of reactors appears to be greatly reduced and since the reacting animals are now being promptly removed it may safely be concluded that the next test will show few, if any, reactors.

## HOG CHOLERA.

As mentioned in my last report Mr. P. M. Pond imported from Oregon a large herd of hogs, about 400 head, more than half of which were brood sows, his intention being to utilize the swill from Schofield Barracks in the production of pork. The only deterring feature in this enterprise would seem to be hog cholera, but as the commercial vaccine now on the market appears to be, in this Territory at least, an almost infallible preventive, and as

the hitherto almost prohibitive price has now been reduced to about one-third of what it used to be, it may reasonably be surmised that, even if vaccination becomes necessary, little loss will be experienced from this disease.

Whether the vaccine as claimed by some, does not absolutely protect against hog cholera unless injected simultaneously with a small amount of a virulent virus, it has been decided not to risk the introduction of a highly virulent and fatal type of hog cholera such as would be required for the purpose, but to resort to vaccination only in herds where the disease has actually made its appearance. Considering the apparently mild type of infection we have to deal with here, this method would seem all that is necessary to completely control and eventually eradicate this disease.

From the Island of Hawaii Dr. H. B. Elliot reports the importation of one mule and one crate of poultry.

The tuberculosis control work is progressing very favorably and the continued efficient coöperation of the Board of Health is assured. During the past month a total of 424 animals have been tested out of which number 11 have been condemned. These condemned animals have been segregated awaiting slaughter.

Respectfully submitted,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

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REPORT OF ASSISTANT VETERINARIAN.

Honolulu, January 31, 1915.

Victor A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of January, 1915:

TUBERCULOSIS CONTROL.

The following dairy herds received the tuberculin test:

	T.	P.	C.
Kualoa Ranch .....	328	303	25
C. H. Quinn.....	4	4	0
Waialae Ranch .....	420	405	15

A total of 752 dairy cattle were tested with the result that 712 were passed and 40 condemned and branded. An opportunity was given to make post-mortem examinations on eight of the 25 animals condemned at Kualoa Ranch, the results of which are as follows:

No. 1. Red and white grade durham cow; reaction large. Lesions: Nodules in the mediastinal glands and diaphragmatic lobes of both lungs. The costal lobe of the right lung contained a large abscess which discharged into one of the bronchi.

No. 2. Holstein cow; reaction medium. Lesions: Both pharyngeal glands greatly enlarged and filled with tuberculous material; mediastinal glands 6"x4" in size and contained cheesy and calcareous material; the entire lungs filled with masses of tuberculous tissues; right costal pleura and pulmonary surface covered with grape-like bunches of tuberculous tissue; liver filled with nodules in the size of a dime. The carcass was condemned entire.

No. 3. Red and white durham cow imported from California; reaction medium. Lesions: The same as in No. 2 with the addition of one mesenteric gland and the supra-mammary glands and udder affected. The carcass was condemned entire.

No. 4. Holstein cow; reaction large. Lesions: One mediastinal gland double the normal size contained a few small nodules.

No. 5. Holstein cow; reaction large. Lesions: Nodules in the mediastinal glands and diaphragmatic lobes of both lungs.

No. 6. Holstein cow; reaction medium. Lesions: Semi-calcareous nodules in the right retro-pharyngeal gland.

No. 7. Red and white grade durham cow; reaction large. Lesions: A few small nodules in the left retro-pharyngeal gland; a few nodules the diameter of a silver quarter in the diaphragmatic lobe of the right lung.

No. 8. Holstein cow; reaction medium. Lesions: Numerous and various sized nodules in both retro-pharyngeal glands, mediastinal glands, diaphragmatic lobes of both lungs and one mesenteric gland. The carcass was condemned entire.

The above post-mortem examinations demonstrate the accuracy of the intradermal test and its ability to pick out those cases of extreme generalized tuberculosis, many of which would probably show no reaction to the subcutaneous test.

#### IMPORTATIONS OF LIVE STOCK.

Matsonia, San Francisco: 1 crate rabbits, W. F. X. Company; 6 crates poultry, Barrere Sales Co.; 3 crates poultry, Chang Brothers.

Lurline, San Francisco: 5 polo ponies, Alexander & Baldwin; 8 crates poultry, Barrere Sales Co.; 1 Guernsey cow, College of Hawaii; 2 crates poultry, Chang Bros.; 1 Berkshire boar, E. O. Hall & Son; 24 mules, Hawaiian Pineapple Co.; 7 crates poultry, L. K. Smith; 34 mules, 1 horse, Schuman Carriage Co.; 12 mules, T. H. Davies & Co.; 2 dogs, 1 crate rabbits, W. F. X. Co.; 2 horses, Gen. J. F. Wisser; 1 horse, Lt. L. D. Baker; 1 dog, Lt. W. F. Winton; 2 dogs, Sergt. Brobson.

Mongolia, San Francisco: 1 white leghorn cockerel W. F. X. Co.

Wilhelmina, San Francisco: 12 crates poultry, Barrere Sales Co.; 10 crates poultry, Chang Bros.; 1 crate turkeys, E. O. Hall & Son; 12 crates poultry, L. K. Smith; 5 crates poultry, C. C. von Hamm; 6 crates poultry, Chong Wah; 1 crate rabbits, 1 crate poultry, 1 can gold fish, W. F. X. Co.

Hyades, Seattle: 1 crate bd. plymouth rocks, J. A. Coombs; 2 Hampshire cows, 1 Hampshire boar, H. C. & S. Co., Kahului.

Columbian, Seattle: 590 hogs—(390 for breeding purposes, 200 for slaughter); 9 horses, 4 cows, grades; 1 calf, grade; 2 crates poultry; A. L. McPherson.

Manoa, San Francisco: 10 crates poultry, Barrere Sales Co.; 1 crate poultry, Chang Bros.; 4 crates poultry, J. F. Podmore; 10 crates poultry, L. K. Smith; 7 crates poultry, Sing Sing Co.; 1 crate poultry, H. H. & Co., Lihue.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

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## DIVISION OF ENTOMOLOGY.

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Honolulu, January 31, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of January, 1915, as follows:

During the month 40 vessels arrived at the port of Honolulu of which 24 carried vegetable matter.

<i>Disposal.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	1,017	23,271
Fumigated . . . . .	1	1
Burned . . . . .	36	40
Returned . . . . .	1	1
Total inspected.....	1,055	23,313

Of these shipments 23,061 packages arrived as freight, 155 packages through the postoffice and 97 packages as baggage of passengers and immigrants.



## RICE AND BEAN SHIPMENTS.

During the month 23,038 bags of Japanese rice, 155 bags of Chinese rice and 1762 bags of Japanese beans arrived from Oriental ports which after careful inspection were found free from pests and were passed for delivery.

## PESTS INTERCEPTED.

Thirty-one packages of fruit and 5 packages of vegetables were found in the baggage of passengers and immigrants from foreign countries. All were seized and destroyed by burning. In one package of juniper seeds from Japan arriving by mail were found larvae of a *Tortricid moth*. The seed was fumigated before delivery. A passenger from Japan brought a dwarf ornamental thuga tree on which all the soil had to be removed. In this soil were found twenty-one grubs of a small weevil. It is the same species which has been found in soil on plants from Japan before and which is reported as being a serious pest on pot plants in that country. Two bundles of Christmas greens were taken away from a passenger on account of being infested by scale insects (*Phenacaspis eugeniae*). These greens came from Sydney, N. S. W., and were intended to be landed in the Territory.

## BENEFICIAL INSECTS.

Mr. D. T. Fullaway has continued with the breeding of the various parasites for the fruit fly and horn fly. During the month many parasites have been distributed in various sections as shown by his report attached hereto.

## HILO INSPECTION.

Brother M. Newell reports the arrival of six steamers and two sailing vessels. Four steamers brought vegetable matter consisting of 163 lots and 2,729 packages. Out of this number twenty sacks of potatoes were returned to the shipper on account of being infested with potato scab.

## INTER-ISLAND INSPECTION.

During the month of December 61 steamers were attended to and the following shipments were inspected and passed: Plants, 91 packages; taro, 532 bags; vegetables, 58 packages; fruit, 1 package; total, 682 packages.

The following packages were refused shipment on account of infestation or of having undesirable soil attached to the plants: Plants 14 packages; fruit, 2 packages; total, 16 packages.

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

#### FRUITFLY CONTROL.

E. M. Ehrhorn, Esq., Superintendent of Entomology.

Sir:—I submit herewith my report on the operations of the insectary during the month of January, 1915:

#### *Propagation.*

*Diachasma fullawayi*—355 females, 710 males.

*Diachasma tryoni*—13 females, 26 males.

*Tetrastichus giffardi*—15,025.

*Spalangia sp.*—18.

#### *Liberation.*

*Diachasma fullawayi*—205 females and accompanying males.

*Tetrastichus giffardi*—13,100.

Of the *Diachasma* 135 were liberated in the Kona district of Hawaii, and 70 at Maunawili Ranch, Oahu; of the *Tetrastichus* 10,000 were liberated in Nuuanu Valley, Honolulu; 900 in the Kona District, Hawaii; 1,000 in the Hilo District, Hawaii; 800 near Lihue, Kauai, and 400 at Moanalua Gardens, Honolulu. All the specimens of *Diachasma tryoni* and *Spalangia* have been retained for further multiplication.

The number of pupae handed during the period corresponding to the above emergence was 31,516 for *Diachasma fullawayi* and 6,210 for *Tetrastichus giffardi*. The percentage of parasitism estimated on these figures is 3% for the former and 16% for the latter.

Respectfully submitted,

D. T. FULLAWAY.

## EXECUTIVE OFFICER'S REPORT.

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Honolulu, February 23, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows my first routine report as Executive Officer of the Board for the month of January, 1915:

On January 16, the day after my return to the Territory, I began work at the office of the Board at the Government Nursery, King street. After several days spent in getting re-acquainted with the routine work of the board and in consultation with your president I ascertained that the most pressing work of the board was the preparation for publication of the biennial report and the making and delivery of an inventory of all of the property of the Territory under the board's jurisdiction. A large share of my time, therefore, was spent on these two important projects during the balance of the month, and on the last day of January both of them were on a fair way toward completion.

Respectfully submitted,

C. S. JUDD,  
Executive Officer

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## DIVISION OF FORESTRY.

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Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows my first monthly routine report of the Division of Forestry for the month of January, 1915:

On January 16, the day after my return to the Territory, I took up the work of the division, which since the resignation of my predecessor, Mr. Ralph S. Hosmer, on September 1, 1914, has been in the care of the forest nurseryman, Mr. David Haughs, who has served as Acting Superintendent of Forestry.

The first few weeks were necessarily spent in picking up the threads of the work and in getting acquainted with the routine of the Division of Forestry. In addition to this, I found it necessary to spend a considerable portion of my time in January as executive officer of the board on two matters which were of paramount importance, viz., the preparation of the biennial report for publication and the making of an inventory of all of the board's property. Consequently, during the two weeks of tenure of office in January no very important matters occupied my attention as Superintendent of Forestry with the following two exceptions:

## GRASS CUTTING ON NUUANU WATERSHED.

On January 26, an application was received to cut grass on the Honolulu Watershed forest reserve in Nuuanu Valley in the region of Luakaha. In view of Forestry Rule 1 which was passed by the board and approved by the Governor on August 22, 1914, and which prohibits such cutting without permit, the application was denied, at least pending further investigation. At the same time it was called to my attention that certain grass cutting was going on in the reserve, especially near the Nuuanu reservoir. I have made a preliminary investigation of the matter, the solution of which will doubtless involve, in part, coöperation with the County and possibly also with the Board of Health, and as soon as my investigation is completed I am sure that the matter will be adjusted in a manner which will be satisfactory and which will safeguard the purity of Honolulu's water.

## PERMIT TO REMOVE STONES.

During the month an application was received for permission to remove ten (10) cubic yards of stone from the Honolulu Watershed forest reserve in Makiki. After a personal investigation with the applicant on the ground, and consultation with the president, I issued, on January 27, a permit for the removal of the material, within six (6) months, from a designated spot in the valley bottom near the lower boundary of the reserve, where the removal of stone will be a benefit rather than a detriment to the land.

## POLICY.

At the inception of my work as Superintendent of Forestry I wish to take this opportunity to express my strong belief in the established policy of the board of rigid protection of the indigenous Hawaiian forests for the purpose of water conservation and to assert that it will give me great pleasure, with the means at my disposal, to uphold and carry out this policy. The work of greatest importance at present appears to be the securing of this protection to the forests by means of fence construction on the boundaries of the forest reserves where it is needed and this will receive my early and diligent attention.

## STUDY OF HAWAII'S WOOD REQUIREMENTS.

The paramount value of the forest reserves of native Hawaiian forests lies in their function of conserving the sources of water supply and equalizing the run off and it is of the greatest importance that this function should be continued and developed through

protection and forest extension. This means that the indigenous forests must be protected from all trespass whatsoever, and that where they are of any value as water conservators, no cutting of timber can be allowed in them. Regardless of what takes place outside the native forest reserves at lower elevations, the necessity of the absolute protection of our reserves of indigenous forests must be kept uppermost in mind.

At the same time the crying need in the Territory for fuel wood must necessarily be heeded. The days when the native forest was cut for this purpose, with destructive results, have almost completely passed, and if it had not been for the timely introduction and natural spread of the algaroba, the people of the Territory would today be badly off for fuel wood. As it is, however, the demand for fuel is today so great that the price of \$14 per cord for algaroba wood delivered in Honolulu is higher than under ameliorated conditions it should be and the plantations and other companies find their fuel wood bills a very large item of expense. The rapid increase in the population of the islands due to the advent of several branches of the military service and other reasons bids fair to make the demand for fuel wood still greater in the very near future.

It therefore appears appropriate that your Division of Forestry should look into the situation carefully and lend every effort toward its amelioration. The present annual consumption of fuel wood and present source of supply should be thoroughly investigated and a study made of the means of increasing the supply by the encouragement of tree planting on present unoccupied waste lands. This, with your approval, I propose to do at the earliest opportunity by making an investigation in the Territory along lines which are similar to those used by the U. S. Forest Service lately in studying the wood using industries in about 36 of the States of the Union in coöperation with State Foresters and other similar officials. The results of these studies, which have been published in bulletins, have proved to be of great value for they indicate among other things the relation of the forests to the industries of the State. Copies of these bulletins are in my office available for inspection at any time. A similar study made by the U. S. Forest Service recently in Porto Rico, brought out the fact of the great demand for fuel on that island and I anticipate that a similar study in these islands will result in findings of the same nature.

Practically the only cost in connection with this study would be the publication of the results, which would amount to a few hundred dollars, for the U. S. Forest Service, with which I still retain a connection as collaborator, has informed me that they would be glad to coöperate with this board in the study in every possible way. Much of the investigation would be carried on by mail to be followed up later by a personal interview of those who

were delinquent in their replies. In making these studies on the mainland the U. S. Forest Service has furnished letter and reply forms and franked envelopes, which require no postage, and I am sure the Service would be glad to coöperate with this board to this extent and possibly in still other ways which may suggest themselves as the study progresses.

The making of this study will doubtless bring out all of the facts needed to formulate plans for relieving the fuel situation in the Territory and other points concerning wood production of related value will be brought to light in the investigation.

Your approval of this project along the above lines, in coöperation with the U. S. Forest Service, is respectfully requested.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry.

#### REPORT OF FOREST NURSERYMAN.

C. S. Judd, Esquire, Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of January:

#### NURSERY.

##### *Distribution of Plants.*

	In seed boxes.	In boxes trans- planted.	Pot Grown.	Total.
Sold . . . . .	500	30	40	
Gratis . . . . .	1000	5150	2088	8238
	<hr/> 1000	<hr/> 5650	<hr/> 2118	<hr/> 8768

#### COLLECTIONS.

Collections on account of plants sold. . . . . \$6.65

#### PLANTATION COMPANIES AND OTHER CORPORATIONS.

The distribution of plants under this heading amounted to 6000 in seed boxes, 3000 in transplant boxes and 1300 pot grown, total 10,300.

#### MAKIKI STATION.

The two men at this station have been kept busy transplanting and potting trees, also mixing and sterilizing soil. It will take

several months to get a good stock again. The great demand for trees during the past three months has reduced our stock considerably, but we are gradually building it up again.

#### HONOLULU WATERSHED PLANTING.

The work on the watershed planting is progressing satisfactorily and the late rains have again soaked the ground so that the planting can go on without interruption.

During the month of January 220 koa and 60 kukui trees were planted. Other work done consisted of hoeing and clearing away the weeds from the small trees, also clearing off and making holes.

#### ADVICE AND ASSISTANCE.

At the request of people in and around the city the writer made eight calls, answered nine inquiries by telephone, gave advice to ten people calling at the nursery and answered six requests by letter from the other Islands.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

---

#### DIVISION OF HYDROGRAPHY.

Honolulu, February 12, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography during January, 1915, is submitted.

#### WEATHER CONDITIONS.

The month was the driest for the past ten months,—the rainfall being very small on all islands. Streams are again approaching minimum discharges, and the water shortage is beginning to be felt in many places. On Oahu the Schofield Barracks and Castner supply which is obtained from the Kaukonahua Stream, is seriously depleted. Honolulu should prepare for the possibility of another period of dry weather during which her water supply should be carefully conserved.

#### KAUAI.

Only maintenance and routine operation work were done. All mauka stream and rainfall stations were visited and were left in first-class condition. Conferences were held with plantation

officials relative to coöperative work, and as a result new equipment will be established on a number of distribution weirs, the records of which determine the amounts paid for water by several plantations.

Equipment for two continuous record measurement stations on the two main branches of the Kapaa River above all diversions, and homesteads, has been ordered and these stations will furnish run-off data of the Kapaa river which will be of great value to homesteaders and to the Territory, in adjusting future water distribution.

#### OAHU.

The greater part of the month was spent on office work, including the collection and working up of 1914 discharge, and rainfall data. All measurement stations were visited, and twenty-three measurements were made.

A provisional estimate of the flood discharge of the Malaekahana and Kahawainui streams for 1913 was prepared, and furnished to the Kahuku Plantation Co.

The channel at the measurement station established to measure the water developed in the east end of the Waiahole tunnel had become so changed by floods that it was no longer suitable for its purpose. It was discontinued on January 1, and a new site selected at a lower elevation. The Waiahole Water Company has agreed to pay the entire cost of establishing a clock register station at the new site, and a Gurley register has been ordered by cablegram for this station. The station will probably be completed by April 1, 1913. A series of measurements showed the outflow from the tunnel on January 22 to be 32 million gallons per 24 hours.

The special seepage and utilization investigation of Waialua plantation was started on January 25, and will be completed in February.

#### MAUI.

Only two days were spent on Maui during which 1914 run-off and rainfall data were collected from coöperating parties.

#### HAWAII.

C. T. Bailey, assistant engineer, spent January 4 to 18 on Hawaii gathering data relative to the discharge of the Wailuku stream and its diversions, and acting as a witness for the Territory in the Hilo Boarding School ditch case.

H. A. R. Austin, junior engineer, spent January 1 to 4th collecting stream flow data relative to the Waiakoloa stream near Waimea, and working ditch seepage measurements at Kohala.



## SPECIAL KONA REPORT.

This report was completed and was sent to the printer on January 25. Three hundred copies will be available about February 20.

Very respectfully,

L. K. LARRISON,  
Superintendent of Hydrography.

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## GOLDEN FINGERS.

---

*The Story of the Banana.*

The golden apples of the Hesperides have ever held a fascination for children—young and old—we are all of us familiar with the stories of that wonderful golden fruit, luscious beyond all others, and possessed of magical powers of nourishment.

Though incurable “matter-of-fact” people try to convince us that the golden apples were nothing but oranges, fairy fruits in a fairy garden they will always remain to the rightminded.

But fairy land is a long way off, and as we get older it grows more and more difficult to get there. After all, the golden apples were not of much use to ordinary folk; they were kept away from the confines of the garden by a dragon. It was only the very cunning or the very strong who succeeded in plucking the spoil.

*Cheap Nourishment of Millions.*

The golden-fingered fruit of today has no such limitation. The banana is open for the world to pluck, and offers cheap nourishment to millions. In comparison with it, the value of the fabled golden apple sinks into insignificance. If ever there were a true fairy story it is that of the banana.

The banana (*Musa Sapientum*) and the plantain (*Musa Paradisiaca*)—it is impossible to draw a line of distinction between them—are widely spread over the whole of the tropics, both of the western and eastern hemisphere, but develop better in the West than in the East.

*How the Banana Grows.*

The term “tree” is scarcely accurate as applied to the banana. What is termed the stem, which is from 8 to 12 feet high, is in reality compound and convolute sheaths of leaves over each

other. The flowers spring up through the center of this sheath-stem, in the form of spikes, along which the flowers are arranged.

It is easily propagated by suckers, and grows in almost any soil except sand or one composed of calcareous matter. A mean temperature of 65° to 68° Fahr. is suitable for the cultivation of the bananas, but the plantain requires at least 3° more.

The young suckers will bear fruit in about a year, each sucker producing fruit weighing from 25 to as much as 90 lbs. Unlike the coconut or cocoa tree the plantation is not a permanent one, and must be regularly renewed with young plants.

### *The Nutritive Value of the Banana.*

The celebrated Humboldt stated that "one acre under plantains yielded as much nutritious food as 144 acres under wheat." A startling statement indeed, yet one that is now accepted as correct by those whom experience of the culture has qualified to judge.

The banana's value as a food is, naturally, what first engages our attention. In this connection it is impossible to over-state its importance to the native of the countries in which it grows. The native may plant a sucker from an old tree in the moist bank of some river and at the end of ten months gather the first crop. The year following the clusters may weigh 60 pounds each. No wonder the native finds no necessity to exert himself, but, in many instances, relies upon the banana solely for his sustenance. The nourishing qualities of the fruit are now fully established, and it can be taken when food of any other kind is inadvisable. The growth of the banana in popularity in this country has been phenomenal. Those of us who have reached middle age can remember well the first tentative introduction into the fruiterer's shop. For some time the imports increased only slightly. People did not understand the fruit; the fact that it should be consumed only when fully ripe was hardly known, and even the condition of ripeness was mistaken for one of decay. With better knowledge of the banana, however, its popularity grew apace until the imports today are estimated to amount to the value of \$10,000,000.

### *Trade Still In Its Infancy.*

Notwithstanding this immense body of imports of bananas, it is impossible to come to any other conclusion than that the banana trade in this country is still in its infancy. The plant is so fecund, it grows with such luxuriance and is so easy of cultivation that there seems to be no limit to production. As regards the consumer's side, the need of a cheap, wholesome and nourishing food, in London alone, is notorious and urgent. Every day sees the popularity of the banana increase and spread, every day its

circle of consumers widens and brings recognition of its merits to fresh purchasers.

There can be no mistake about it—bananas are a new food thoroughly established in the favor of a large section of the populace, growing steadily in popularity and with a certainty of future consumption to which it is not easy to estimate a limit.

### *Subsidiary Uses.*

Apart from its prime use, as a food, the banana has by-products of very considerable value.

The sap has important use as a mordant in dyeing.

The fibre of one tree will furnish 4 lbs. material for paper and textile fabrics.

The top of the stem makes good ink.

The flour of the plantain is highly esteemed in the West Indies as a food for invalids and children, and indeed for this purpose is regarded as distinctly superior to arrowroot.

Experiments are now proceeding with the skins for the production of dyes, and with the "rejects" for the manufacture of flour. *Invest in the Tropics (London).*

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## ARTIFICIAL MILK.

---

A discovery which should prove of great interest to housewives and mothers has recently been brought to perfection in a London chemical laboratory. This is a process of manufacturing synthetically a pure and wholesome milk of high nutritive value, possessing all the virtues of the original article but none of its many dangers.

The discovery originated many years ago as the result of the ingenuity of a Chinaman who saw a possible substitute for milk in the native drink prepared from the soya beans. His efforts, however, met with only partial success owing to the fact that the fluid prepared by him had an exceedingly penetrating and—to Western palates—disagreeable taste. It was left to a German chemist to lay the foundations of the present synthetic milk by suggesting a composite fluid, made up of all the ingredients of cow's milk in correct proportion.

This suggestion was widely discussed about two years ago, but the many obvious difficulties standing in the way of its realization caused the public to regard it more as a dream than a possibility. One or two chemists, however, attracted by the idea, continued to work at the subject, with the result that synthetic milk is now an accomplished fact!

## TASTE OF THE NEW MILK.

The fluid (says the Times), as far as its appearance is concerned, is quite indistinguishable from rich cow's milk. It is delightfully smooth on the palate. On the other hand, the taste seems to some persons slightly different from that of ordinary milk. It is said that even this slight "taste" can be removed at will. A dairyman was recently asked to express his opinion of the new milk, and two glasses, one containing his own milk and the other the artificial fluid, were placed before him. He praised what he supposed was his cow's milk and expressed a very modified appreciation of the other. His surprise on learning of his error was naturally great.

## INTRODUCTION OF BACTERIA.

The new milk has been built up from a basis of casein obtained from the soya bean. Casein, of course, is likewise the basal constituent of cow's milk. The beans are treated by a special process whereby all oil and waste matter are removed and only the pure casein left. To this basis are added in exact proportions fatty acids, sugars and salts and emulsification is carried out.

The difficulty of producing a perfect emulsion (milk is one of the most perfect emulsions known) has been completely overcome, the new fluid satisfying every test in this direction, even to the extent of refusing to "cream."

Milk, however, is something more than a food substance; it is a living fluid containing a definite strain of bacteria which assist in its digestion. In order that the synthetic milk may approximate in all respects to the real milk bacteria of the required strains, including the lactic acid (sour milk) bacilli rendered famous by Metchnikoff a few years ago, are introduced to the fluid and permitted to act upon it until it reaches exactly that state of what may be termed maturity at which fresh cow's milk is obtained. That it is indeed a real milk is proved by the fact that excellent cheese and "butter" can be made from it.

The advantages of the new milk are obvious. It is, of course, free from all suspicion of being contaminated with "milk-borne" diseases like tuberculosis, scarlet fever, or diphtheria. It can, moreover, be made up in any proportions desired, that is with more or less casein fat, sugar, or salts, and thus can be supplied to children and invalids according to a medical prescription. Finally, the new milk can be produced more cheaply than any ordinary milk, and should thus prove a real boon to the poor.

The distinctive taste of the milk is due to the use which is made of the soya bean. It is almost impossible to describe it, since like the taste of celery or cinnamon it is peculiar to itself and characteristic. A sample of the milk was submitted to a food expert

who has travelled extensively in the Far East, with the request that he would, if possible, name the ingredient imparting the flavor to it. Without hesitation, and with a smile at the pleasant memories recalled, he declared "soya," and added: "The history of that bean is like a romance."

#### USES OF THE SOYA BEANS.

That this statement is no exaggeration is proved by the fact that while the first consignment of soya beans was sent to Europe so recently as 1906 today Western requirements are something like a million tons a year. The beans are grown in China, Japan, Korea and Manchuria, where they have long been valued for their oil and for the waste products after the oil has been extracted, which are used as fertilizers in the rice and sugarcane fields. Vermicelli biscuits and other foodstuffs are also manufactured from the beans.

In this country the soya oil has now a very ready and extensive market. It is used instead of the cotton seed variety on account of cheapness. Soap manufacturers are also coming to depend upon it. The chief use, however, would seem to be as cattle cakes for winter feeding. That the article which has fed so many milch cows during the last few years should itself be used in the making of artificial milk is undoubtedly something of a coincidence.

Most of the soya beans entering this country pass through Hull, which, with its great oil and seed mills, is the natural center for such a commodity. This import trade is already a very extensive one, the freights on soya beans having mounted up to a figure somewhere in the neighborhood of \$5,000,000 per annum. In addition a considerable export trade has recently sprung up owing to the demand of continental dairy farmers for soya meal.—*Indian Agriculturist*.

---

#### PRICKLY PEAR FOR DAIRY COWS.

(*E. W. Morse, Dept. of Agriculture, Queensland.*)

The prickly pear is denounced as Australia's greatest pest in your issue of 2nd April, page 767. If the species found there is anything like the American prickly pear, perhaps the result of a test by the dairy division of the bureau of animal industry may be of interest.

Prickly pear is very palatable to dairy cows, and when fed in amounts varying from 60 to 100 lbs. a day makes the cow very thrifty and productive. Larger amounts are too laxative in effect. The pear is low in protein and high in mineral matter. It contains from 87 to 93 per cent of water, and hence is a capital sup-

plement for cotton seed and its products. Compared for milk-making with other southern roughages, 1 lb. of sorghum hay equals 10.1 lbs. of pear, 1 lb. of sorghum silage equals 3.3 lbs. of pear, and 1 lb. of cotton seed hulls equals 8.8 lbs. of pear. By substituting 60 to 75 lbs. of pear for a portion of dry roughage, the per cent of fat in the milk dropped .42 per cent on the average, but the milk flow increased.

Two dry cows were maintained for fifty and sixty days respectively on 113 and 105 lbs. of pear and 2 lbs. of cotton seed meal daily. One cow fed pear alone lost 30 lbs. in weight in seventy days. Another cow died from stoppage of the intestine by fibre balls from the pear when it was the sole ration. Pear-fed cows were more sensitive to the cold, and lost about 7.5 per cent in milk flow when fed a heavy pear ration, as compared to 1.91 per cent for cows on a dry ration. Cows fed pear drank less water, those receiving no roughage except pear going for days at a time without drinking. This shows pear to be a valuable feed when there is a scarcity of water.

One man can singe a ton of pear in fifty minutes with a gasoline torch, using 1 2-3 gallons of gasoline. The pear is singed on the stalk, and may then be pastured, which is wasteful, or cut and fed. The spineless pear is about the same in composition, may be harvested more cheaply, but yields less product. It costs about 6 dol. to 7 dol. per acre to establish a field. Shallow cultivation for weeds and grass is necessary. The second year's yield in Texas was 85 tons per acre, while the yield from old stumps runs above 100 tons per acre.—*Breeders' Gazette*.

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## TRIUMPH OF THE ITALIAN TOMATO.

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The tomato was given to the world by America, but Italy is today teaching the rest of the world by example how it should be raised and how it should be preserved. Italian canned tomatoes have practically pushed the American product out of the English market, and have gained an enormous market in the United States. The Italians raise a solid meaty tomato of fine color and it is so packed in the cans that the consumer is not obliged to pay for a large percentage of water.

Canned tomatoes, however, are put up principally for the export trade. The Italians themselves prefer their tomatoes in the form of sauce or paste, which is nothing more nor less than boiled-down tomato pulp, minus the skins and seeds, as set forth in an interesting manner in a report by Commercial Agent J. Alexis Shriver, entitled "Canned-Tomato Industry in Italy," recently issued by the Bureau of Foreign and Domestic Commerce. This sauce is put up in cans and is used by the Italians in a great variety of dishes, of which spaghetti is, perhaps, the most familiar to Americans.

According to fairly accurate statistics the area planted in tomatoes in Italy is about 22,000 acres, producing about 385,000 tons. The exports to the United States amount to about 20,000,000 pounds of canned tomatoes and tomato sauce, and some 8,000,000 pounds of the product go to South America. The total value of the tomato exports from Italy is well over \$6,000,000.

The skins and seeds that were formerly wasted are now utilized, the former as stock feed and the latter as a source of oil. The crude oil is suitable for soap making and for lamps and the refined oil is said to be edible. Commercial Agent Shriver's report, "Special Agents Series No. 93," may be obtained from the Superintendent of Documents, Government Printing Office, Washington, at 5 cents a copy.

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### BRITISH COLUMBIA COW ESTABLISHES RECORD.

Consular Reports has published the following information from Consul General R. E. Mansfield, Vancouver, Canada:

A Holstein cow at the Colony Farm, Escondale, British Columbia, has broken all records in Canada for milk production, and established a new world's record for a period of 86 successive days, during which time she produced 9376 pounds of milk and 107 pounds of butter. The cow is a pure-bred Holstein, 4 years old. She produced 3415 pounds of milk and 98 pounds of butter in 30 days, and her record for 7 days is 833 pounds, and for 1 day 123 pounds of milk. The highest record cow on the Colony Farm, also a Holstein, produced in 350 days 27,888 pounds of milk. In the same herd there are 10 cows with 1-day records of 100 pounds of milk each.

The "Colony" is one of the prize dairy farms in the province, the herd being composed entirely of animals selected especially for their milk-producing qualities.

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### WHAT EVERY POULTRY-KEEPER SHOULD KNOW.

Don't allow male birds to run with the hens after the hatching season is over.

Eggs cannot be produced without nitrogenous food in some shape. Bones are absolutely essential.

Roosts so narrow that birds must be continually straining to keep their balance will cause them to lay soft-shelled eggs.

Charcoal is good for poultry, having a healthful influence over the whole system. They will eat much of it when placed within reach.

In selecting ducks for breeding, size of frame, length of body, and general activity should be looked for. Without size of body we cannot expect to obtain large ducklings.

Usually not enough attention is paid to the family history of fowls for breeding purposes, as regards their health. Constitutional weakness, though it be apparently overcome, should never be allowed to enter the breeding pen.—*Poultry*.

### DUSTING PLACES FOR FOWLS.

Fowls young and old alike must dust! On the surface the runs are dry enough to provide the birds with dusting holes in odd corners out in the open. Few there are who do not enjoy "bathing" to the full these days. The smallest of our chicks are in the fashion as soon as the warm and dry weather sets in. They scratch holes in the earth and wallow in it to their heart's content. Indeed, so much do they indulge in dust baths in the sunshine that anyone not understanding the habits of fowls might imagine them to be sorely troubled with lice! And yet there never were cleaner birds.

It is the time of year for sunning and dusting, and fowls of all ages delight in it. In grass runs it may be difficult to allow the birds full scope in this direction. All is well if there is a hedge-row accessible, or some well-grown bushes. However, when such means are not to hand, one must contrive. A dusting box in a small shed is often more bother than it is worth, and better that the box be in the open in a sunny corner. A good dust hole can be made by removing a large turf and just loosening the earth with a garden fork. Make the space big enough for half-a-dozen fowls, and after loosening the earth shake into it the soil from the lifted turf. The birds will take to it as a duck to water; it is Nature's way of keeping them clean.—*Exchange*.

### FEATHER PLUCKING.

Although I have an abundance of room for my fowls I am obliged to keep them within limits, because I raise eight varieties, and every year I have some cases of feather plucking. I have discovered a method of combating this vice, which has proved successful in every case. I make a paste of vaseline and powdered aloes and work it into the plumage of the birds which are being plucked, all around the plucked area. This paste is intensely bitter, and after a hen has plucked one feather which has been treated she is satisfied and gives it up. It is amusing to watch a feather-plucker when she gets a treated feather in her throat. She first gasps, then she wipes her beak in the straw or tries to scratch the bitter taste out of her mouth with her foot, and for several minutes comes as near making wry faces as a hen can. As my hens usually begin on the males I have no trouble about plucked hens, since I began using this mixture.



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# Board of Agriculture and Forestry

## PUBLICATIONS FOR DISTRIBUTION.

The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

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## DIVISION OF HYDROGRAPHY.

Rooms 20-22 Kapiolani Bldg. Tel. No. 3662.

The Division of Hydrography has on hand free publications relative to the water resources of the Hawaiian Islands. These publications furnish detailed data as to daily, monthly, mean, maximum, and minimum run-off of streams and ditches, and also cuts and maps pertaining to the different islands. Much descriptive data relative to the mountain ranges and physical configuration of each island are also contained. These publications will be mailed free of charge on request.

The United States Geological Survey topographic map of Kauai is also on sale, and copies will be mailed on receipt of 50 cents.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

This division will also make ditch seepage losses and utilization investigations when the actual cost of the labor, materials, subsistence, transportation, etc., of such investigations is paid by those benefited.

G. K. LARRISON,  
Superintendent of Hydrography.

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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

**DAVID HAUGHS,**  
Acting Superintendent of Forestry.

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### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the also specimens of the injury. In a tin with a hole or two, or a wood box specimens may be mailed by parcels post. When specimens not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications to  
**SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX  
HONOLULU, HAWAII.**

**EDW. M. EHRHORN**  
Superintendent

# THE HAWAIIAN FORESTER AGRICULTURIST

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No. 4

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## PEARL OYSTER POSSIBILITIES.

Oyster culture has been tried in comparatively recent times at Pearl Harbor, Oahu, but with small success and nothing has been heard of any revival of the experiment for some years, although the harbor named has upon its shores remains of ancient oyster beds of great extent. A late number of the *Agricultural News* discusses a suggestion in another periodical that there is considerable possibility of the founding of a pearl oyster industry in the British West Indies. It mentions the fact that an old bed still exists on the windward coast of Barbados, and says that, "although attempts in the past to establish an industry in this island have not been successful, it has probably been due to want of knowledge, for it is understood that a very thriving industry exists at the Danish island of St. Thomas."

Thus it would appear that the conditions for such a thing are about even as between Oahu and Barbados. Mr. Prest, a well-known Canadian authority, is quoted as saying, in the *Canada-West India Magazine*:

"The conditions prevailing in most of the islands are sufficiently similar to those obtaining in Ceylon to justify the importation of the Ceylon pearl oyster which is one of the most highly productive kind. An abundance of microscopic food is required by the animal and also an absence of competing organisms. The sea bottom should have an uneven, mixed, rocky and sandy surface interspersed with broken coral and weeds, to prevent over-crowding and the drifting of sand. There must also be in existence a gentle current for the conveyance of fresh food, and the temperature must be equable and warm."

In conclusion the *Agricultural News* says:

"As regards the return to be expected, it is stated that in Ceylon \$100 worth of pearls per 1000 shells is regarded as a profitable industry. The Bahrein fisheries yield over two million dollars of pearls annually, employing over 800 boats. In Ceylon the fisheries are even more valuable, and it is evident that the establishment of this industry in the West Indies would enor-

mously strengthen the finances of the colonies, provide labor for those who are not required on the estates, and be a source for obtaining revenue from natural sources not connected with the soil."

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### PAPER FROM SUGAR-CANE TRASH.

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This magazine has always taken note of any information regarding paper-making material from tropical growths. The following statement of the value of sugar-cane bagasse for that purpose is credited by the International Sugar Journal to William Raitt:

"One hundred tons of cane give 25 tons of bagasse or 11.1 tons of coarse unbleached paper, which costs \$45 per ton to make, and sells for \$64.20, leaving \$19.20 per ton profit, or \$213 per 100 tons of cane. Deducting the cost of oil to substitute for bagasse, say \$20, there remains \$193 profit at the factory.

"On other hand, we are severely handicapped by remoteness from the world's industrial centers and we have no opportunity to find a local market. Suppose it costs, however, over all, \$15 a ton to cover marketing expenses, or \$170 per 11.1 tons of coarse unbleached paper, there still remains a profit of \$23 per 100 tons of cane."

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In this number will be found a selected article on dry farming, which, reading like a romance, will no doubt be eagerly perused by homesteaders.

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In the March number an interesting article appeared, dilating upon the food value of the banana—or "golden fingers," as the fruit was called in the heading. Following up a topic discussed in a previous article—which was reprinted in the Forester—Tropical Life (London) for February magnifies the sweet potato as well as the banana for its foodstuff possibilities while the "staff of life," or wheat bread, is "broken in the land" by the hammer of war. The entire article is reproduced on another page and will repay study.

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An article in this number from Tropical Life, on "Exploiting Eucalyptus Trees," will have much local interest, from the fact that eucalypts have been the subject of considerable attention in the reforestation operations of our division of forestry.

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By the February report of the division of animal industry it will be seen that the extension of the campaign against bovine tuberculosis to the islands other than Oahu has made substantial progress.



Hog cholera control in the Territory would appear to be as nearly effective as possible, according to the report of the veterinarian for February.

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The periodical outbreaks of cerebro spinal meningitis among equine stock seem to constitute the most formidable problem of the animal industry division at present.

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Dr. Norgaard, in his report for February, again effectively replies to cavilling at the quarantine of dogs against rabies.

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There is scarcely a month these times which does not show additions to imported thoroughbred stock of various kinds including fowl. Evidently animal industry in the islands is constantly looking up.

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Both in the prevention of insect pest invasion and the introduction and propagation of useful insects the division of entomology from month to month maintains its good record.

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In the present Legislature the homesteader does not want champions, but it is too early at this writing to say what will be the results of their efforts.

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Nearly 15,000 plants distributed in February is the good record made by the division of forestry.

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The bill mentioned by the superintendent of hydrography, in his February report, for the appointment of a commission to investigate the water resources of the Territory, has become law.

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### CASSAVA FOR PIGS.

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In Queensland cassava is used as food for pigs with success, and is found to be a good substitute for the potato. The pig eats the cassava either raw or cooked, and digests it equally well in both cases, and uses all the hydrocarbonic matter, amounting to about 80 or 90 per cent of the total quantity consumed. All that is needed is to soak the tubers for some hours in cold water, to obtain a food ready for immediate consumption, a food, the nutritive value of which is equal to barley or rice meal. At the same time, cassava must not be considered as a complete ration, as it is necessary to supplement it for young animals, at least, with food containing the phosphates and nitrates wanting in cassava. For this purpose oil cake and ground green bones are used, or, better still, degelatinized bones powdered.—Agricultural News.

## DIVISION OF ANIMAL INDUSTRY.

## HOG CHOLERA.

Honolulu, March 12, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have to report that hog cholera has made its appearance on Maui, Dr. Fitzgerald, under date of Feb. 25, reporting two small outbreaks, one on the Haleakala ranch and the other on the Maui Agricultural Co.'s ranch. The infected premises were immediately placed under quarantine and sufficient hog cholera vaccine secured for the treatment and prevention inoculation of all affected and exposed hogs. The origin of the outbreak remains obscure, no hogs having been introduced from any of the other islands for several months past, nor has there been any transfer of animals between the two places, which are more than seven miles apart. I am therefore inclined to believe that the outbreak is due to a recrudescence of infection already on the premises, which theory is supported by the extremely mild form in which the disease has made its appearance.

With the timely application of serum there is consequently little danger of serious losses, even though it is doubtful whether the established quarantine will prove effective.

From Hawaii and Kauai no new outbreaks have been reported, one report investigated by Dr. Elliot proving not to be hog cholera.

On Oahu the disease now seems to be well under control, the fact that no definite case of hog cholera has appeared among the several hundred imported hogs that are being swill-fed near Schofield Barracks being almost a guaranty that the disease has either died out or become so attenuated that the animals are able to resist it.

A few cases of pneumonia have occurred, some among suckling pigs, and while the post mortem lesions in some of these bear a close resemblance to those seen in swine plague, they are, if of specific origin at all, most likely due to other bacteria such as the pneumo-coccus for instance. In any case every precaution possible has been taken to deal with an outbreak, should it make its appearance, and in the meantime hog raising is steadily increasing and rapidly becoming one of the most important branches of the live stock industry.

## BOVINE TUBERCULOSIS CONTROL WORK.

Very little testing has been done here during the past month, the semi-annual general test being planned for the middle of March. From Hawaii Dr. Elliot reports the testing of 17 small herds with a total of 90 cattle, among which two reactors were

found. These figures include a quarterly retest of three dairies which contained no less than 35 reactors when previously tested, while on this occasion only one was found. This certainly looks promising for the early suppression of the disease in the Hilo district, after which it is to be hoped that some arrangement can be made that will allow Dr. Elliot to extend the work to the entire island.

Both Drs. Fitzgerald and Glaisyer report the testing of various herds and while perhaps in a less systematic way than Dr. Elliot, still every reactor located and branded is one center of infection less to deal with when system has been established.

The annual report (1914) of the U. S. Bureau of Animal Industry has been received and shows that the work of eradicating bovine tuberculosis in the District of Columbia has reached almost exactly the same stage as our own work, that is, their last complete test gave 2.03 per cent of reactors, while ours gave 2.08 per cent. But while the District of Columbia herds aggregated only 1628 animals (33 reactors), we dealt with nearly 7250 head (151 reactors), and while the District of Columbia paid respectively 50, 75 and 100 per cent indemnity for badly diseased, slightly diseased and doubtfully diseased animals, we paid none. The work was begun in both places almost at the same time (1910), and similar to our extending it to the other islands so is the bureau gradually taking in the surrounding parts of Virginia and Maryland in gradually widening circles, they having last year tested 5779 cattle in Virginia (3.49 per cent reactors) and 1155 head in Maryland (3.64 per cent reactors).

#### CEREBRO SPINAL MENINGITIS OR FORAGE POISONING.

A rather severe outbreak of this disease has occurred in one of the plantation stables on this island, nine valuable animals (7 mules and 2 horses) dying in the course of a few days. In this connection the same federal report states that, though a number of large outbreaks have occurred in seven different States and the disease has been under constant observation and investigation, nothing more is known today about its nature, cause, treatment or prevention than was known years ago, and that is nil. There is no other disease before which the live stock sanitarian of today stands so absolutely helpless; there is nothing he can suggest beyond the most elementary precautions such as change of feed, pure water and general cleaning up and disinfecting of the premises. Even the expert of the Rockefeller Institute, the very man who solved the mystery of infantile paralysis, has failed to get one step nearer to the etiology of this fatal disease, which, so far as this Territory is concerned, remains the only serious menace to horse stock since glanders was eradicated. Every effort even to produce the disease, to transmit it from one animal to another,

has failed, and long continued feeding experiments with polished rice or with hominy (corn with the outer shell removed) caused no inconvenience or symptoms of nervous derangement, and the total absence of a specific micro organism, even an ultra microscopic one, makes it of course impossible to attempt the now so universally used serum therapy.

Since the above was written it has become necessary to destroy three additional mules similarly affected, making the total loss in one week 10 mules and 2 horses.

#### RABIES.

This disease continues unabated in the Pacific Coast States, various epidemics having been reported from such localities, especially where single cases were reported from three to six months ago. When, therefore, this board's quarantine regulation pertaining to rabies has again come in for criticism by Coast tourists through the columns of the local press, it may not be amiss to state that the reappearance of the disease in one of the above-mentioned localities in California has, so to speak, "struck home," a lovely little girl related to a Honolulu family having recently died after being bitten in the face by a mad dog. The child saw through a screen door a strange dog on the porch and opened the door to pet it, when the animal flew at her and lacerated her face. Almost immediately afterward the dog died and an examination by the Berkeley experts pronounced it affected with rabies. The child was immediately sent to the Pasteur Institute for treatment but, the wounds being so close to the brain, she succumbed on the twenty-first day—the last day of the treatment. As no time was lost in getting the patient under treatment—in fact less than twenty-four hours—it can easily be understood what the result might be if the disease should gain an entrance here where at least seven days would elapse before a bitten person could be either sent to the nearest Pasteur institute, in San Francisco, or the material for preventive inoculation could be cabled for and reach the patient here. This case is however an unusual one, the time of incubation as a rule being a great deal longer than 21 days, the appearance of the disease in the bitten person depending to a great extent upon the distance of the wound from the brain. The virus must first find its way into the central nerve canals at the place of injury and from there slowly work its way to the brain. Consequently the further from the brain the wound is inflicted the longer it takes for the poison to reach the brain and, as fortunately 75 per cent of all bitten wounds occur on the hands and legs, there is generally sufficient time to get the patient under treatment and to get the treatment, which requires 21 days, completed before the disease sets in. With the appearance of the first symptom, however, the patient is doomed, nothing remaining to

be done but to attempt to ease the agony of the victim, which however is a very difficult matter, the nervous suffering being so intense that the ordinary remedies, morphine for instance, are almost without effect and chloroform narcosis must be continued until death.

It therefore becomes manifest that every precaution must be taken to exclude the disease from this Territory and were it left to the writer the quarantine period would be extended to six months instead of, as at present, four. The only countries known to be free from rabies are England, Australia and New Zealand, in all of which a six months' quarantine is rigidly enforced. The impression voiced in the newspaper article above referred to, in which the said tourist held that the dog in question could have been shipped to Australia first and then returned to Hawaii, thereby avoiding the quarantine (dogs from Australia being admitted to the Territory without quarantine), is therefore based on a misapprehension. The dog could not have been landed in Australia without going into quarantine for six months, nor could it have been transhipped at an Australian port and receive the certificate required for entry here which must certify to the length of time a dog has been in Australia.

On the other hand, it is not desired to place any unnecessary obstacles in the way of bringing dogs into the Territory, in which connection I wish to state that all the dogs on board the interned German vessels now docked in the harbor of Honolulu, and which have been quarantined on board their respective ships, were released from quarantine last week, all the ships having been here more than four months, and all the dogs accessible to examination being found apparently healthy. The same privilege will be granted dogs on board interned vessels anchored outside the harbor when application for release is made and the dogs presented for examination.

#### QUARANTINE STATION.

With regard to the small dog hospital to be built at the Honolulu station and for which an appropriation was made at the last meeting of the board, I regret to say that the keeper of the station, Mr. Steward, has been dangerously ill for the past two weeks and was recently taken to the Queen's Hospital for a major operation. He is, however, now on the way to recovery and the work will begin as soon as he is able to resume his duties.

Very respectfully,

VICTOR A. NORGAAARD,  
Territorial Veterinarian.

## REPORT OF ASSISTANT VETERINARIAN.

Honolulu, February 28, 1915.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of February, 1915: .

## TUBERCULOSIS CONTROL.

The following were submitted to the tuberculin test:

	T.	P.	C.
Waialae Dairy .....	4	4	0
St. Clair Sayers.....	1	1	0

## POST MORTEM EXAMINATIONS.

Two cows condemned in the early part of 1914 were examined at one of the local slaughter houses, the results being as follows:

No. 1. Grade Durham cow imported from the State of Washington. Reactions large. Lesions: A few wall encapsulated nodules in the lungs.

No. 2. Jersey. Reaction small. Lesions: Retro-pharyngeal glands enormously enlarged and an entire mass of tuberculous tissue; lungs and mediastinal glands filled with nodules; supra-ummary glands enlarged and filled with nodules and the udder simply a mass of tubercles.

## LIVE STOCK IMPORTATIONS.

Matsonia, San Francisco: 7 crates poultry, Chang Bros.; 4 crates poultry, Ching Wan; 3 crates poultry, W F X Co.

Virginian, Seattle: 1 crate barred Plymouth Rocks, C T Company.

Sierra, San Francisco: 3 crates poultry, 3 rabbits, W F X Co.; 1 crate chickens, P. H. Boggs.

Lurline, San Francisco: 4 crates poultry, Barrere Sales Co.; 8 crates poultry, Chang Bros.; 4 crates poultry, Ching Wan; 11 crates poultry, Club Stables; 5 crates poultry, C. H. Lewis; 4 crates poultry, Chang Bros.; 6 crates poultry, Sing Song Company; 55 mules, 2 horses, Schuman Carriage Company; 1 crate white rats, U. S. Lep. Exp. Station.

Wilhelmina, San Francisco: 7 crates poultry, Barrere Sales Co.; 1 crate Guinea hens, J. F. Colburn; 1 English bulldog, James B. Laing.

Dix, Seattle: 28 horses, Q. M. Dept.

Manoa, San Francisco: 1 Holstein Bull, D. P. R. Isenberg; 10 crates poultry, J. F. Reed; 9 crates poultry, Barrere Sales Co.; 9

crates poultry, W. F. Pogue, Maui; 2 rabbits, 1 crate poultry, 1 crate pheasants, 1 crate pea fowls, 1 crate Chinese geese, W F X Company.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

### DIVISION OF ENTOMOLOGY.

Honolulu, February 28, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of February, 1915, as follows:

During the month 47 vessels arrived at the port of Honolulu of which 25 carried vegetable matter and two vessels moulding sand. Seven of these vessels came via the Panama Canal.

<i>Disposal.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	599	19,544
Fumigated .....	2	25
Burned .....	31	31
Returned .....	4	4
Total inspected.....	636	19,604

Of these shipments 19,382 packages arrived as freight, 163 packages through the postoffice and 59 packages as baggage of passengers and immigrants.

### RICE AND BEAN SHIPMENTS.

During the month 23,341 bags of Japanese rice, 27 sacks of Chinese rice and 1974 bags of Japanese beans arrived from oriental ports, which after thorough inspection were found free from pests and were passed for delivery.

### PESTS INTERCEPTED.

Twenty-three packages of fruit and 5 packages of vegetables were taken from the baggage of passengers and immigrants from foreign countries; all were destroyed by burning. In one package of flowering bulbs we found many bulbs infested with the bulb aphid (*Pemphigus species*), and fumigated the package before delivery. A lot of onions and garlic taken from a Filipino was found infested with the larvae of a *Lepidopteron*; this illustrates

... would be to introduce such pests. All such foodstuffs ... from these immigrants whether clean or infested, ... make a careful study of the materials before burning ... A shipment of coconuts from Fanning Island was fumigated ... on account of being infested with scale insects ... (*Aspidiotaspis minor*). A cacao pod containing seeds and con- ... to the Hawaii experiment station arrived in a decayed con- ... The seeds were carefully removed and the decayed pod was burned; no indications of insect infestation were found. Two packages of tree seeds, one package of bulbs and one package of plants arriving from foreign countries were returned by the postmaster as unmailable under the ruling of the Federal horticultural board.

#### BENEFICIAL INSECTS.

Mr. D. T. Fullaway has continued with the breeding of the various parasites for the fruitfly and hornfly. During the month many parasites have been distributed in various sections as shown by his report attached hereto.

Owing to a slight outbreak of the cottony cushion scale we were able to rear and distribute two strong colonies of the Australian ladybug (*Vedalia cardinalis*).

#### HILO INSPECTION.

Brother M. Newell reports the arrival of eleven steamers five of which brought vegetable matter consisting of 150 lots and 2936 parcels. Out of this lot 25 sacks of potatoes had to be overhauled for scab and dirt, and seven sacks out of the lot were destroyed as not being free from disease. During the month the T. K. K. steamer Kiyu Maru arrived direct from Japan bringing 9180 sacks of rice, 449 bags of beans and 60 bags of peanuts, all of which were found free from weevils and other pests.

#### INTER-ISLAND INSPECTION.

During the month of February 62 steamers plying between Honolulu and the ports of the other islands were attended to and the following shipments were inspected and passed:

Plants, 110 packages; taro, 720 bags; fruits, 11 packages; vegetables, 62 packages; total, 903 packages.

The following packages were refused shipment on account of infestation or of having undesirable soil attached to the plants: Plants, 28 packages; fruit, 19 packages; total, 47 packages.

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.



## REPORT OF INSECTARY.

Honolulu, February 28, 1915.

E. M. Ehrhorn, Superintendent of Entomology.

Sir:—I submit herewith my report on the operations of the insectary during the month of February, 1915:

## PROPAGATION.

*Diachasma fullawayi*—794 females and 1588 males.

*Diachasma tryoni*—44 females and 88 males.

*Tetrastichus giffardi*—8200.

## LIBERATION.

*Diachasma fullawayi*—681 females and accompanying males.

*Tetrastichus giffardi*—7600.

Of the *Tetrastichus* 6500 were liberated in upper Nuuanu valley (Spencer's and McLean's) and 1100 under an elengi tree close to the insectary. Of the *Diachasma* 591 were liberated in Nuuanu valley mostly at Spencer's, and 90 under an elengi tree close to the insectary.

The number of pupae handled during the period corresponding to the above emergence was 21,908 for *Diachasma fullawayi* and 3151 for *Tetrastichus giffardi*. The percentage of parasitism estimated on these figures is 10% for the former and 17% for the latter.

Respectfully submitted,

D. T. FULLAWAY.

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 DIVISION OF FORESTRY.

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 Honolulu, March 11, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report for the Division of Forestry for the month of February, 1915:

## FOREST FIRE ON KAUAI.

Besides two matters, which have already been made the subject of special reports, nothing of particular importance has come up in the Division of Forestry with the exception of a forest fire on the island of Kauai. This started from a grass fire set in dry weather by a homesteader, Joe Rodrigues Aguiar, on his homestead lot No. 44, Series 1, Kapahi, on February 6. A strong wind fanned the fire, which soon began to spread, and, although he

made every effort to extinguish it by back firing and constructing firebreaks, the fire spread through the grass into the Kealia forest reserve and burned over an area of approximately 275 acres on both sides of the ridge that starts at the Akulikuli springs and was stopped where this ridge joins the main mountain range at Kapahi. About 150 acres of native forest was burned over.

District Fire Warden G. P. Wilcox employed 76 men to fight this fire on February 6, 7 and 8, and on the last day finally extinguished it at a total cost of \$84.50. Aguiar worked all three days on the fire and has not been paid for his services.

I have considered the advisability of prosecuting Aguiar for the responsibility of starting this fire, but since he did not allow "said fire to escape from his control *without using every effort to extinguish it*," as shown above, he is apparently relieved under the law from prosecution. However, I have cautioned him by a strong letter to be more careful with the use of fire in the future and that otherwise it may go hard with him next time. I have also asked the district fire warden to watch out for him.

As during January, a large share of my time has been used in February in getting out the inventory of property in the possession of the board and in editing and publishing the board's biennial report.

The appended report of the forest nurseryman shows the activities in his department during the month.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry.

#### REPORT OF FOREST NURSERYMAN.

Honolulu, March 11, 1915.

C. S. Judd, Esq., Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of February, 1915:

#### NURSERY.

##### *Distribution of Plants.*

	In seed boxes.	In boxes trans- planted.	Pot Grown.	Total.
Sold . . . . .	3000	....	60	3060
Gratis . . . . .	6600	150	197	6947
	<hr/> 9600	<hr/> 150	<hr/> 257	<hr/> 10,007

## COLLECTIONS.

Collections on account of plants sold amounted to \$4.60.

## PLANTATION COMPANIES AND OTHER CORPORATIONS.

The number of trees distributed under this heading amounted to 4850 (600 in seed boxes, 3100 in transplant boxes and 1150 pot grown).

## MAKIKI STATION.

The two men employed at this station have been doing the regular routine work, which consists of mixing and sterilizing soil, transplanting and potting trees, etc.

## HONOLULU WATERSHED PLANTING.

During the month 434 koa and 1887 kukui trees were planted, making a total of 2321. The total number of trees planted on and around Sugar Loaf to date amounts to 10,486 (koa, 6850; kukui, 3636). We are having favorable weather for this work and all the trees planted so far are doing exceedingly well.

## ADVICE AND ASSISTANCE.

The following gives the number of visits made and advice given to people applying for same: Visits to places in and around city, 8; requests for advice by telephone, 12; requests for advice by people calling at nursery, 10; requests for advice by letter to people on the other islands, 7.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

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It is stated in The Board of Trade Journal for August 20, 1914, that a thirty years' concession has been granted for the exploitation of coconut groves in the zone of the Pacific coast of Costa Rica to a company known as Compania de Cicales del Pacifico. The company undertakes to preserve and replant the existing coconut palms and to plant coconuts in those places where they do not already grow. The company is also to establish within a year a transport service consisting of sailing vessels of at least 15 tons register, fitted with auxiliary petrol motors of 20 h.p. The company as well undertakes to establish a factory in San Jose for the extraction of coconut oil.

## DIVISION OF HYDROGRAPHY.

Honolulu, March 12, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography during February, 1915, is submitted:

## WEATHER CONDITIONS.

Except for the period February 20 to 24, the rainfall for the month was far below normal, and streams are again nearing minimum flow. The water in Wahiawa and the upper Nuuanu reservoirs has reached a very low stage.

## UTILIZATION INVESTIGATIONS.

An investigation of ditch losses on the Waialua Agricultural Co. plantation was completed, and measurements were made to check the Venturi meter and weir maintained below Wahiawa reservoir. The loss by seepage in one of the ditches of Kahuku plantation was also checked. Copies of these reports are appended hereto.

## PUNALUU WATER.

Additional investigations made in the Punaluu valley on Oahu lead to the conclusion that a minimum of about eight million gallons per day, and an average of about ten million gallons per day, of excellent water may be obtained at the 800-foot level in that valley, and may be diverted without interfering with existing diversions in the lower valley. Attached hereto are copies of letters to the Governor and H. K. L. Castle relative to the utilization of this water.

A new stream measurement station was installed in coöperation with the Waiahole Water Co. on the Waiahole stream at a point about one thousand feet below their power plant, which will keep a continuous record of the amount of water developed in the north end of the Waiahole tunnel. The water company paid all costs of this station except for the services of the engineer in charge, who is paid from Federal funds. The outflow from this end of the tunnel has dropped from 32 million gallons per day on January 22 to 30 million gallons per day on March 4.

## LEGISLATION.

Several conferences have been held with other territorial officials relative to the investigation and conservation of Hawaii's

water supply. As a result it is probable that a bill will be introduced in the near future in the House of Representatives to provide for the appointment of a commission to investigate the water supply and the existing laws pertaining thereto to the 1917 Legislature of the Territory of Hawaii.

#### CHANGES OF PERSONNEL.

On February 5, Mr. J. C. Dort, assistant engineer, who has been in charge of the island of Kauai, was directed to report at San Francisco for further orders. Mr. Dort has served a two and one-half year assignment to this Territory, and, according to the agreement made with him when he reported here for duty, is now entitled to an assignment on the mainland. Mr. Dort is a civil service employee of the U. S. Geological Survey. He will be replaced by Mr. W. V. Hardy, assistant engineer, who was formerly in charge of Kauai and who will report for duty about March 15. In the meanwhile Mr. D. E. Horner, who has acted as assistant to both Mr. Hardy and Mr. Dort, will be in charge of the work on Kauai.

Mr. Howard Kimble, assistant engineer, who has been in charge of special utilization work, including seepage investigations, has tendered his resignation effective March 31.

#### OPERATION AND MAINTENANCE.

The usual operation and maintenance work on Oahu, Kauai and Maui was carried on during the month. A considerable amount of minor repair work has been done, and all equipment and structures are in excellent condition.

#### MARCH PLANS.

In addition to routine and maintenance the following special work will be handled:

##### KAUAI.

The construction of the stream gaging station being built in coöperation with the Hawaiian Sugar Co. on the Olokele river will be started on March 10, and work on the two stream gaging stations on the Kapaa river above the Kapaa homesteads will be started during the latter part of the month.

##### OAHU.

A small amount of ditch loss investigation work will be done on the Kahuku plantation, and a number of weirs and ditches of

the Heeia Agricultural Co. in the Heeia and Kaneohe valleys will be checked by measurements. Additional measurements and investigations will be made relative to the Punaluu water utilization project. Further information and data will be gathered in relation to Honolulu's future water supply.

MAUI.

Seepage losses from the ditches of the Maui Agricultural Co., the Hawaiian Commercial & Sugar Co. and the Pioneer Mill Co. will be investigated.

Very respectfully,

L. K. LARRISON,  
Superintendent of Hydrography.

LIST OF GAGING STATIONS MAINTAINED BY THE DIVISION OF  
HYDROGRAPHY ON FEBRUARY 28, 1915.

Island.	Maintained on Jan. 31.	Discontinued in February.	Established in February.	Maint. on Feb. 28.	Regu- lar.	Measurements. Miscel- laneous.
Kauai . . . . .	33	a*	a*	33a*	3	0
Oahu . . . . .	46	0	1	47	5	8
Maui . . . . .	42	0	0	42	6	1
Total . . . .	121	0	1	122	14	9

Note.—In addition to above, Mr. Kimble made about 10 seepage measurements during the month.

a\*—Kauai report not yet in to date.

WAR, WHEAT, AND TROPICAL FOODSTUFFS.

Referring to our leader last August on the above subject, wherein we discuss how the tropics can supply us with foodstuffs to replace wheat and cereals to some degree, and relate how one wheat-consuming center which had increased its demands by 22 per cent during the same period that its supplies have increased only  $4\frac{1}{2}$  per cent, since that article was written we have noted, especially of late, repeated references in the international press, and especially the English papers, to the tendency of the price of wheat, and therefore of bread, to further advance, a fact that is not failing to strike home to all thinking men and women. Among the journals whose notes strike us as being particularly useful just now is the Colonial Journal for January. Firstly, in the way it has reviewed the government's arrangements to keep our tropical colonies and dependencies going, and especially where

it very truthfully adds: "It is very important to Great Britain to keep the tropical industries going, and great efforts have been made to support markets and prevent the discouragement of native growers." Further on our contemporary, speaking of the utilization of the potato in Germany and its enormous economic value during the war, says: "Vast quantities of this product are used for making spirit, and the industrial position of the country largely rests on this abundant and cheap supply. Some forty-five million tons of potatoes are grown annually, and a considerable portion of this is dried in factories and used as a food for both men and cattle. This dried stock is now forming a very important food reserve, and is being largely used in the making of bread." Compared to this, England and her Dominions overseas no doubt are safe for their wheat supplies, for "it is estimated that this spring 13,000,000 acres will be sown with wheat in Canada alone," a quantity which at twenty bushels per acre would suffice to feed the whole population of Great Britain, especially as, besides this, has to be added the production *chez nous*.\* In the tropics, however, things are not as they should be. Many centers, both under the British flag as well as those belonging to other countries, as we have already pointed out, are not producing sufficient foodstuffs to feed themselves. "A nation that cannot free itself is not worthy to be free," and in like manner a people that has not the foresight and energy to grow its own foodstuffs is not worth troubling about, like "the ass that was left to starve because it was too obstinate to carry its own fodder." Many of the natives do not deserve any pity; unfortunately, we must put up with their easy-going life when times are prosperous and feed them at times like these; but this animal indifference to the future diverts any antipathy we might have to the suggestion that thriftless natives should be taxed in normal times as they will never be induced to grow more than their immediate requirements demand, and so the authorities must act for them, and lay up for a rainy day to provide them with the food that they neglect to grow for themselves, or having grown it, eat up greedily so long as it lasts. The Americans complain of the Philippines for this reason, but our own island of Trinidad, British West Indies, has always been a bad offender in the same way, as we pointed out in our October issue, when we discussed "Tropical Gardening" and expressed the hope that the book of Mr. Macmillan (of Ceylon) on the subject would be widely read and acted upon.

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\* It may be of interest to note that Germany is said to produce 28 bushels of wheat per acre, against 20 bushels in France, and only 15 in the United States. Our American cousins, to whom we owe these figures, produce, it seems, 80 bushels of potatoes only to the acre, against 190 in France, 226 in Germany, and 286 in Belgium. Efforts are being made to increase the American output.

## REPORT OF ASSISTANT VETERINARIAN.

Honolulu, February 28, 1915.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of February, 1915: .

## TUBERCULOSIS CONTROL.

The following were submitted to the tuberculin test:

	T.	P.	C.
Waialae Dairy .....	4	4	0
St. Clair Sayers.....	1	1	0

## POST MORTEM EXAMINATIONS.

Two cows condemned in the early part of 1914 were examined at one of the local slaughter houses, the results being as follows:

No. 1. Grade Durham cow imported from the State of Washington. Reactions large. Lesions: A few wall encapsulated nodules in the lungs.

No. 2. Jersey. Reaction small. Lesions: Retro-pharyngeal glands enormously enlarged and an entire mass of tuberculous tissue; lungs and mediastinal glands filled with nodules; supra-ummary glands enlarged and filled with nodules and the udder simply a mass of tubercles.

## LIVE STOCK IMPORTATIONS.

Matsonia, San Francisco: 7 crates poultry, Chang Bros.; 4 crates poultry, Ching Wan; 3 crates poultry, W F X Co.

Virginian, Seattle: 1 crate barred Plymouth Rocks, C T Company.

Sierra, San Francisco: 3 crates poultry, 3 rabbits, W F X Co.; 1 crate chickens, P. H. Boggs.

Lurline, San Francisco: 4 crates poultry, Barrere Sales Co.; 8 crates poultry, Chang Bros.; 4 crates poultry, Ching Wan; 11 crates poultry, Club Stables; 5 crates poultry, C. H. Lewis; 4 crates poultry, Chang Bros.; 6 crates poultry, Sing Song Company; 55 mules, 2 horses, Schuman Carriage Company; 1 crate white rats, U. S. Lep. Exp. Station.

Wilhelmina, San Francisco: 7 crates poultry, Barrere Sales Co.; 1 crate Guinea hens, J. F. Colburn; 1 English bulldog, James B. Laing.

Dix, Seattle: 28 horses, Q. M. Dept.

Manoa, San Francisco: 1 Holstein Bull, D. P. R. Isenberg; 10 crates poultry, J. F. Reed; 9 crates poultry, Barrere Sales Co.; 9



crates poultry, W. F. Pogue, Maui; 2 rabbits, 1 crate poultry, 1 crate pheasants, 1 crate pea fowls, 1 crate Chinese geese, W F X Company.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

## DIVISION OF ENTOMOLOGY.

Honolulu, February 28, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of February, 1915, as follows:

During the month 47 vessels arrived at the port of Honolulu of which 25 carried vegetable matter and two vessels moulding sand. Seven of these vessels came via the Panama Canal.

<i>Disposal.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	599	19,544
Fumigated . . . . .	2	25
Burned . . . . .	31	31
Returned . . . . .	4	4
Total inspected.....	636	19,604

Of these shipments 19,382 packages arrived as freight, 163 packages through the postoffice and 59 packages as baggage of passengers and immigrants.

### RICE AND BEAN SHIPMENTS.

During the month 23,341 bags of Japanese rice, 27 sacks of Chinese rice and 1974 bags of Japanese beans arrived from oriental ports, which after thorough inspection were found free from pests and were passed for delivery.

### PESTS INTERCEPTED.

Twenty-three packages of fruit and 5 packages of vegetables were taken from the baggage of passengers and immigrants from foreign countries; all were destroyed by burning. In one package of flowering bulbs we found many bulbs infested with the bulb aphis (*Pemphigus species*), and fumigated the package before delivery. A lot of onions and garlic taken from a Filipino was found infested with the larvae of a *Lepidopteron*; this illustrates

how easy it would be to introduce such pests. All such foodstuffs are confiscated from these immigrants whether clean or infested, but we make a careful study of the materials before burning same. A shipment of coconuts from Fanning Island was fumigated before delivery on account of being infested with scale insects (*Nemichionaspis minor*). A cacao pod containing seeds and consigned to the Hawaii experiment station arrived in a decayed condition. The seeds were carefully removed and the decayed pod was burned; no indications of insect infestation were found. Two packages of tree seeds, one package of bulbs and one package of plants arriving from foreign countries were returned by the postmaster as unmailable under the ruling of the Federal horticultural board.

#### BENEFICIAL INSECTS.

Mr. D. T. Fullaway has continued with the breeding of the various parasites for the fruitfly and hornfly. During the month many parasites have been distributed in various sections as shown by his report attached hereto.

Owing to a slight outbreak of the cottony cushion scale we were able to rear and distribute two strong colonies of the Australian ladybug (*Vedalia cardinalis*).

#### HILO INSPECTION.

Brother M. Newell reports the arrival of eleven steamers five of which brought vegetable matter consisting of 150 lots and 2936 parcels. Out of this lot 25 sacks of potatoes had to be overhauled for scab and dirt, and seven sacks out of the lot were destroyed as not being free from disease. During the month the T. K. K. steamer Kiyu Maru arrived direct from Japan bringing 9180 sacks of rice, 449 bags of beans and 60 bags of peanuts, all of which were found free from weevils and other pests.

#### INTER-ISLAND INSPECTION.

During the month of February 62 steamers plying between Honolulu and the ports of the other islands were attended to and the following shipments were inspected and passed:

Plants, 110 packages; taro, 720 bags; fruits, 11 packages; vegetables, 62 packages; total, 903 packages.

The following packages were refused shipment on account of infestation or of having undesirable soil attached to the plants: Plants, 28 packages; fruit, 19 packages; total, 47 packages.

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

## REPORT OF INSECTARY.

Honolulu, February 28, 1915.

E. M. Ehrhorn, Superintendent of Entomology.

Sir:—I submit herewith my report on the operations of the insectary during the month of February, 1915:

## PROPAGATION.

*Diachasma fullawayi*—794 females and 1588 males.

*Diachasma tryoni*—44 females and 88 males.

*Tetrastichus giffardi*—8200.

## LIBERATION.

*Diachasma fullawayi*—681 females and accompanying males.

*Tetrastichus giffardi*—7600.

Of the *Tetrastichus* 6500 were liberated in upper Nuuanu valley (Spencer's and McLean's) and 1100 under an elengi tree close to the insectary. Of the *Diachasma* 591 were liberated in Nuuanu valley mostly at Spencer's, and 90 under an elengi tree close to the insectary.

The number of pupae handled during the period corresponding to the above emergence was 21,908 for *Diachasma fullawayi* and 3151 for *Tetrastichus giffardi*. The percentage of parasitism estimated on these figures is 10% for the former and 17% for the latter.

Respectfully submitted,

D. T. FULLAWAY.

## DIVISION OF FORESTRY.

Honolulu, March 11, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report for the Division of Forestry for the month of February, 1915:

## FOREST FIRE ON KAUAI.

Besides two matters, which have already been made the subject of special reports, nothing of particular importance has come up in the Division of Forestry with the exception of a forest fire on the island of Kauai. This started from a grass fire set in dry weather by a homesteader, Joe Rodrigues Aguiar, on his homestead lot No. 44, Series 1, Kapahi, on February 6. A strong wind fanned the fire, which soon began to spread, and, although he

made every effort to extinguish it by back firing and constructing firebreaks, the fire spread through the grass into the Kealia forest reserve and burned over an area of approximately 275 acres on both sides of the ridge that starts at the Akulikuli springs and was stopped where this ridge joins the main mountain range at Kapahi. About 150 acres of native forest was burned over.

District Fire Warden G. P. Wilcox employed 76 men to fight this fire on February 6, 7 and 8, and on the last day finally extinguished it at a total cost of \$84.50. Aguiar worked all three days on the fire and has not been paid for his services.

I have considered the advisability of prosecuting Aguiar for the responsibility of starting this fire, but since he did not allow "said fire to escape from his control *without using every effort to extinguish it*," as shown above, he is apparently relieved under the law from prosecution. However, I have cautioned him by a strong letter to be more careful with the use of fire in the future and that otherwise it may go hard with him next time. I have also asked the district fire warden to watch out for him.

As during January, a large share of my time has been used in February in getting out the inventory of property in the possession of the board and in editing and publishing the board's biennial report.

The appended report of the forest nurseryman shows the activities in his department during the month.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry.

#### REPORT OF FOREST NURSERYMAN.

Honolulu, March 11, 1915.

C. S. Judd, Esq., Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of February, 1915:

#### NURSERY.

##### *Distribution of Plants.*

	In seed boxes.	In boxes trans- planted.	Pot Grown.	Total.
Sold . . . . .	3000	....	60	3060
Gratis . . . . .	6600	150	197	6947
	<hr/> 9600	<hr/> 150	<hr/> 257	<hr/> 10,007

## COLLECTIONS.

Collections on account of plants sold amounted to \$4.60.

## PLANTATION COMPANIES AND OTHER CORPORATIONS.

The number of trees distributed under this heading amounted to 4850 (600 in seed boxes, 3100 in transplant boxes and 1150 pot grown).

## MAKIKI STATION.

The two men employed at this station have been doing the regular routine work, which consists of mixing and sterilizing soil, transplanting and potting trees, etc.

## HONOLULU WATERSHED PLANTING.

During the month 434 koa and 1887 kukui trees were planted, making a total of 2321. The total number of trees planted on and around Sugar Loaf to date amounts to 10,486 (koa, 6850; kukui, 3636). We are having favorable weather for this work and all the trees planted so far are doing exceedingly well.

## ADVICE AND ASSISTANCE.

The following gives the number of visits made and advice given to people applying for same: Visits to places in and around city, 8; requests for advice by telephone, 12; requests for advice by people calling at nursery, 10; requests for advice by letter to people on the other islands, 7.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

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It is stated in The Board of Trade Journal for August 20, 1914, that a thirty years' concession has been granted for the exploitation of coconut groves in the zone of the Pacific coast of Costa Rica to a company known as Compania de Cacaos del Pacifico. The company undertakes to preserve and replant the existing coconut palms and to plant coconuts in those places where they do not already grow. The company is also to establish within a year a transport service consisting of sailing vessels of at least 15 tons register, fitted with auxiliary petrol motors of 20 h.p. The company as well undertakes to establish a factory in San Jose for the extraction of coconut oil.

# DIVISION OF HYDROGRAPHY.

Honolulu, March 12, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography during February, 1915, is submitted:

## WEATHER CONDITIONS.

Except for the period February 20 to 24, the rainfall for the month was far below normal, and streams are again nearing minimum flow. The water in Wahiawa and the upper Nuuanu reservoirs has reached a very low stage.

## UTILIZATION INVESTIGATIONS.

An investigation of ditch losses on the Waialua Agricultural Co. plantation was completed, and measurements were made to check the Venturi meter and weir maintained below Wahiawa reservoir. The loss by seepage in one of the ditches of Kahuku plantation was also checked. Copies of these reports are appended hereto.

## PUNALUU WATER.

Additional investigations made in the Punaluu valley on Oahu lead to the conclusion that a minimum of about eight million gallons per day, and an average of about ten million gallons per day, of excellent water may be obtained at the 800-foot level in that valley, and may be diverted without interfering with existing diversions in the lower valley. Attached hereto are copies of letters to the Governor and H. K. L. Castle relative to the utilization of this water.

A new stream measurement station was installed in coöperation with the Waiahole Water Co. on the Waiahole stream at a point about one thousand feet below their power plant, which will keep a continuous record of the amount of water developed in the north end of the Waiahole tunnel. The water company paid all costs of this station except for the services of the engineer in charge, who is paid from Federal funds. The outflow from this end of the tunnel has dropped from 32 million gallons per day on January 22 to 30 million gallons per day on March 4.

## LEGISLATION.

Several conferences have been held with other territorial officials relative to the investigation and conservation of Hawaii's

water supply. As a result it is probable that a bill will be introduced in the near future in the House of Representatives to provide for the appointment of a commission to investigate the water supply and the existing laws pertaining thereto to the 1917 Legislature of the Territory of Hawaii.

#### CHANGES OF PERSONNEL.

On February 5, Mr. J. C. Dort, assistant engineer, who has been in charge of the island of Kauai, was directed to report at San Francisco for further orders. Mr. Dort has served a two and one-half year assignment to this Territory, and, according to the agreement made with him when he reported here for duty, is now entitled to an assignment on the mainland. Mr. Dort is a civil service employee of the U. S. Geological Survey. He will be replaced by Mr. W. V. Hardy, assistant engineer, who was formerly in charge of Kauai and who will report for duty about March 15. In the meanwhile Mr. D. E. Horner, who has acted as assistant to both Mr. Hardy and Mr. Dort, will be in charge of the work on Kauai.

Mr. Howard Kimble, assistant engineer, who has been in charge of special utilization work, including seepage investigations, has tendered his resignation effective March 31.

#### OPERATION AND MAINTENANCE.

The usual operation and maintenance work on Oahu, Kauai and Maui was carried on during the month. A considerable amount of minor repair work has been done, and all equipment and structures are in excellent condition.

#### MARCH PLANS.

In addition to routine and maintenance the following special work will be handled:

##### KAUAI.

The construction of the stream gaging station being built in coöperation with the Hawaiian Sugar Co. on the Olokele river will be started on March 10, and work on the two stream gaging stations on the Kapaa river above the Kapaa homesteads will be started during the latter part of the month.

##### OAHU.

A small amount of ditch loss investigation work will be done on the Kahuku plantation, and a number of weirs and ditches of

(4) That thin seeding, for wheat 30 to 40 pounds per acre, gives larger returns than more lavish sowing. This is due to the fact that each individual plant has more moisture, sunlight and food if given ample space.

(5) That the durum wheats have given the best results. They are the wheats which have extended the wheat-belt into the most arid regions of Western America.

(6) That the durum wheat—*Apulia*—has been grown under our dry-farming system without a drop of rain falling upon it from seed-time until harvest, which proves the efficacy of the moisture-saving fallow, and is a record in modern agriculture.

#### A GERMAN TESTIMONY.

A short time ago a fair-headed, blue-eyed Viking was sent from Berlin to Windhuk to grow two blades of grass where but one grew before, in the person of Mr. Walter Richter, the Agricultural Adviser to German Southwest Africa. He spent several months in British South Africa investigating our soils and crops with the skill, the patience, and the industry for which his race is so justly renowned. To our question: "What do you consider the most instructive part of your tour?" Mr. Richter replied without hesitation: "The Dryland Experiment Station at Lichtenburg. There I saw durum wheat being harvested which not only had been grown on a poor shallow soil, but actually never had a drop of rain upon it from seed-time until harvest. There, also, I saw *dry land* which is never dry the whole year round. I go back to German Southwest Africa filled with a new hope, for now I am convinced that dry-farming is destined to revolutionize our agricultural industry. Truly, as the motto of your Congress puts it: "The destiny of South Africa is on the dry lands."

Every great movement is indissolubly linked up with the personality of a few earnest workers. So it is with dry-farming in South Africa. The signal success which we have achieved is due in large measure to Captain Heinrich du Toit, a brave Boer officer of the former Staats Atillerie who bore a charmed life, as shown by marks of twenty-two bullets. Captain du Toit returned to the peaceful life of a Cape farmer. When the government dry-land station was established he was appointed manager—a post which he still holds. He has since become the tireless missionary of the new agriculture amongst the Dutch and the English settlers on the dry lands of the Union.

#### MOISTURE BANK AND HUMUS BANK.

Hardly a season passes but we hear of crops that have failed because of lack of rain, and this complaint is not confined to any particular dominion, but is more or less common to all parts of the Empire. Search the pages of the rural magazines, consult the



columns of the daily Press, and, sooner or later, your eye will light on that sombre line: "The crop has failed this year owing to drought." And the amazing thing is that no remedy is ever suggested, no preventive is ever proposed. Decade after decade, year in and year out, drought finds the farmer unprepared, watching sadly his withering crop in sun-scorched waterless soil.

The Alpha and Omega in the fight against drought is the moisture-saving fallow. Without it all effort is useless. With it all soil-drought disappears. Suppose we start with the bare moisture-saving fallow and we conserve six inches of rain out of a 12-inch annual rainfall. We hold the fallow for a year and then sow our wheat in a moist seed-bed. The second season another twelve inches may fall in the field, of which, say, six inches are utilized by the plants, and so, at the end of the second year, instead of one or two possible failures, we reap a 30-bushel\* (12-inch rainfall) crop of wheat. The establishment of a moisture savings bank to pay cash on demand is the fundamental principle in dealing successfully with recurrent seasonal droughts. This practice is strongly advocated by the foremost Australian authority on dry-farming, Sutton of New South Wales, who writes:

"In dry districts a proper system of fallowing is therefore an essential of success, and the general adoption of a proper system in our wheat districts is a factor which will do more than any other to remove wheat-growing from the area of speculation and place it on a sound and solid basis. With a proper system in practice, the rainfall of the previous, or a portion of the previous year, can be stored, conserved, and utilized for a subsequent crop."

And he closed an instructive address to an assemblage of farmers with these words: "Go back home and fallow till harvest time, and when the harvest is over, start to work the fallow and keep at it until seed-time."

It may be said that the practice of growing crops on only half of the arable land and maintaining the other half in clean fallows means a good deal of extra labor. That is so, but it also means a certain crop in seasons of drought. It may be said that the continuous cultivation of the moisture-saving fallows will eventually burn out the vegetable matter in the soil. It may be so; but the remedy is at hand. On worn-out fallows you can always grow green legumes, fill the soil with nitrogen, and so gradually establish a humus bank. These two saving banks—the Moisture Bank and the Humus Bank—will secure the farmer against the severest drought and make possible a permanent fertility on the dry-lands of South Africa.

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\* Widtsoe calculates the crop-producing power of rainfall as follows:  
 One acre inch of water will produce 2½ bushels of wheat.  
 Ten acres inches of water will produce 25 bushels of wheat.  
 Twenty acres inches of water will produce 50 bushels of wheat.

## THE YEAR OF DROUGHT.

The prospect of a year of drought is the favorite topic of conversation for those lukewarm Laodiceans who, by idle criticism, vainly try to check the progress of dry-farming. Drought to the intelligent dry-farmer is no more than a passing storm to the skilful mariner at sea. Before us lie two authentic records of farms where the year of drought brings no dismay. These records are taken from the admirable work on dry-farming of the most eminent American authority, Dr. John H. Widtsoe of Utah. The first farm belongs to Senator Barnes of Utah, and is situated in the Salt Lake Valley. The climate is semi-arid, the summers are dry and the evaporation large. Over a period of nineteen years crop and rainfall records have been most carefully kept. There has been only one crop failure, and that was the first, when the land was not yet properly tilled. The heaviest crop of wheat, 29.8 bushels, was harvested in the year 1902, when next to the lowest rainfall occurred, which varied from 10.33 inches to 18.36 inches. Moisture-saving fallows followed every crop.

A second and equally instructive record is furnished by the Government Experiment Farm at Indian Head in Saskatchewan, Canada. Here also reliable records have been kept for the same period—viz., nineteen years. Not a single crop failure is recorded. The highest yield was forty-nine bushels to the acre, the lowest seventeen. During this period the rainfall varied from 3.9 to 20.22 inches (snowfall not included—varying from 1.3 inches to 2.3 inches of water). Here also moisture-saving fallows followed every crop.

These experiments clearly show that the year of drought need not be feared when the principles of dry-farming are properly carried out. In the conservation of soil moisture lies the ultimate conquest of drought. And in place of the barren desert, abandoned homes, and dying cattle, we can now paint a new and glowing picture. There, under a serene and cloudless sky, lies a panorama of green and chocolate-brown—mile after mile the growing wheat and the deep-stirred, water-holding fallow. No rain may fall for many a day, but the husbandman is untroubled. For he knows that his seed has fallen upon good ground, and that, from far below, those life-streams are flowing ever upward which will carry his hundredfold corn white unto the harvest.

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(1915)

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H. A. R. Austin, *Junior Engineer, Oahu.*

E. E. Goo, *Clerk.*

## CLERICAL STAFF.

m, *Stenographer and Librarian.*

C. L. Seybolt, *Clerk.*

, *Editor of the Forester.*

# Board of Agriculture and Forestry

## PUBLICATIONS FOR DISTRIBUTION.

The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

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## DIVISION OF HYDROGRAPHY.

Rooms 20-22 Kapiolani Bldg. Tel. No. 3662.

The Division of Hydrography has on hand free publications relative to the water resources of the Hawaiian Islands. These publications furnish detailed data as to daily, monthly, mean, maximum, and minimum run-off of streams and ditches, and also cuts and maps pertaining to the different islands. Much descriptive data relative to the mountain ranges and physical configuration of each island are also contained. These publications will be mailed free of charge on request.

The United States Geological Survey topographic map of Kauai is also on sale, and copies will be mailed on receipt of 50 cents.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

This division will also make ditch seepage losses and utilization investigations when the actual cost of the labor, materials, subsistence, transportation, etc., of such investigations is paid by those benefited.

G. K. LARRISON,  
Superintendent of Hydrography.

VOL. XII.

MAY, 1915

No. 5

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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

C. S. JUDD,  
Superintendent of Forestry.

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### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the also specimens of the injury. In a tin with a hole or two, or a wood box specimens may be mailed by parcels post. When specimens not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications  
**SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 2  
HONOLULU, HAWAII.**

EDW. M. EHRHORN,  
Superintendent of Entomology.



# THE HAWAIIAN FORESTER & AGRICULTURIST

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VOL. XII.

MAY, 1915.

No. 5

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## HEN FLEAS AND ANTS.

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Dr. Illingworth's article in this number, on the hen flea, will be welcomed by poultry raisers here, as the pest mentioned is one of the things that make people who keep a few hens for domestic economy's sake tired of the gentle industry. By following the directions in the paper they may hope to get rid of this particular nuisance.

An interesting point in the article is the reference to the work of the small brown ant in getting away with these fleas. If the little "brownie" is a benefactor in this respect, its character is different from that given, with respect to injurious plant insects, to the small black biting ant. A letter from a planter in the Seychelles group, forwarded by the curator of the botanic gardens in Dominica to the Agricultural News, arraigns the little black fellow as a mischief worker. It is charged with transplanting the larvae of certain noxious scales from their birthplaces to the leaves of valuable fruit trees and plants, such as grafted mango, young orange shoots, pineapples, etc. The writer of the letter says:

"Personally I have been convinced for a long time that the ant is responsible for the spread of many injurious insects. It roams over the whole land here, and I believe it selects by instinct or by trial every plant or tree that suits those insects of which it can make use and then starts the colonies of them. I am under the impression that the large black biting ant also cultivates insects for use, but in this case altogether underground and possibly on roots. If there is any practicable method of abolishing ants, I should be very glad indeed to hear of it."

## DIVI-DIVI A VALUABLE DYE SOURCE.

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Introducing the following article from the Board of Trade Journal for December 24, 1914, the Agricultural News (W. I.) says that divi-divi has often been mentioned in its columns, and that the commercial product consists of the pods of *Caesalpinia coriaria*, which is a native of the tropical regions of America and occurs in West Africa:

"The board of trade committee for chemicals and dye stuffs has received the following information from a reliable source: Divi-divi is a very useful dye extracted from the seed-pod of a

small tree which grows wild in almost inexhaustible quantities over the arid regions of the peninsula of Goajira. The product is collected by the native Indians, part being taken to Rio Hacha and part to Maracaibo in Venezuela, whence it has hitherto been taken in sailing ships to Curaçao and thence to Hamburg, which is the distributing center for the rest of Europe. The bulk is disposed of in Russia.

"Up to 1895, all the divi-divi was shipped to the United Kingdom, but the trade was then diverted to Germany, owing to the greater facilities offered by German commission houses, mainly in the direction of financial accommodation, and cheap warehousing.

"Divi-divi is usually shipped loose, but it is not difficult to reduce the bulk by compressing it into bales; in this form the freight is reduced by about one-half, and the product also fetches a higher price.

"In regard to the volume of business to be done, the following figures will be of interest. Official data from the custom house at Rio Hacha give the export for the last five years as 2075 tons in 1909, 3895 tons in 1910, 5997 tons in 1911, 1246 tons in 1912, and 2078 tons in 1913. The price varies between \$40 and \$50 per ton, and the freight between \$5.50 and \$10.40.

"In addition to shipments from Rio Hacha, a very considerable amount finds its way to Curaçao direct from the Goajira coast-line by coasting steamers, and shipments are made from Maracaibo about equal in volume to those from Rio Hacha."

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In his reference to hog cholera, in his March report, Dr. Norgaard offers a caution against the "serum simultaneous method"—which he explains—as carrying danger of infection and unjustifiable except in the event that a virulent form of the malady should appear and spread to many herds. Happily, the report shows that hog cholera at the time of writing was well under control in the Territory.

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It would appear from the veterinarian's report that little need be feared from cerebro spinal meningitis among equine stock in these islands if the advice of the division respecting feed be followed.

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That bovine tuberculosis control will not be allowed to lapse, after the grand record that has been made since it was started five years ago, may be gathered from Dr. Norgaard's statement in his report in this number, taken in connection with municipal assurances. Cattle testing, according to this, will still be done for "dairymen and cattle owners who apply for the test." Therefore, if the virtual pledge given by the chairman of the sanitation committee of the board of supervisors, that the milk ordi-

nance will be fully enforced, be faithfully observed, it will be necessary for all dairymen supplying milk to the community to procure certificates from competent veterinarians that their milk-giving cows are free from tuberculosis.

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Importation of pure-bred live stock and high grades of poultry continues to be recorded from month to month, materially advancing the solution of the problem of subsistence, for the population of Hawaii, to the full capacity of profitable home production.

---

Effective work was done again in March, by the division of entomology, both in the exclusion of pests arriving at the territorial gates and in the prosecution of noxious fly control.

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Among other applications for permits for economic utilization of hitherto unconsidered forest products, on the government reserves, an important one seems to be that for the gathering of kukui nuts as raw material for the manufacture of kukui nut oil on a commercial scale. According to what has appeared in the press, at various times, this ought to become an important addition to the list of small local industries.

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With funds now available, the division of forestry is going to add largely to the mileage of forest reserve fencing. In this matter, as well as in that of vigilance against fires, Hawaii continues to maintain a creditable record in public forestry.

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With 7332 plants to the general public and 5550 to corporations distributed in March, besides 1100 kukui trees planted above the city, a degree of progress in covering the waste places of hill, plain, valley and home plots with watershed protection, shade and ornament is indicated by the forest nurseryman's report, which is exceedingly pleasant to contemplate. Many can remember the time when writers of books on the Hawaiian Islands contrasted their brown and barren appearance from the ocean with the emerald gorgeousness of groups in southern Polynesia. The dismal aspect of Hawaii thus described is fast disappearing.

---

If the algaroba tree seed going from Hawaii to China work the transformation of landscape in that country which the lone tree, still preserving vitality at the Catholic mission here since it was planted by Father Bachelot in the first half of last century, did throughout these isles, "Far Cathay" will more than ever be entitled to be called the celestial empire.

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There is nothing of especial moment in the report of the division of hydrography for March, but enough to show that the

chief and his staff are kept busy all the time. Results of this branch of the agricultural bureau's services will become more valuable and appreciated as the years pass. Righteousness is truly declared in Hawaii's motto to be the "life of the land," but water in its way is equally an essential element in the country's vitality.

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## DIVISION OF ANIMAL INDUSTRY.

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### HOG CHOLERA.

Honolulu, March 31, 1915.

To the Commissioners of the Board of Agriculture and Forestry.

Gentlemen:—I am pleased to report that the hog cholera situation appears to be favorable in a general way to the hog industry. There have practically been no losses during the past month and the largest hog raiser on this island, who has in the neighborhood of 900 head, has lost less than half a dozen large animals during the past three months, and only a comparatively small number of young pigs have succumbed to pneumonia. It has therefore not been necessary to resort to serum injections on a large scale, but experiments with pneumonia serum have been carried on at this place, as well as at Mr. Atkinson's ranch near Watertown. No definite results have so far been obtained from these experiments, but it is believed that if applied systematically a considerable percentage of young pigs may be saved by this treatment.

In regard to the general injection of hog cholera serum together with hog cholera virus, that is the so-called "serum simultaneous method," and which several hog raisers have been desirous of applying to their herds in order to protect them against any hog cholera infection which might possibly remain here, I wish to quote from a magazine recently received, as follows:

"In sections where hog cholera is not present and has not prevailed for a year or more it is unwise to use anti-hog cholera serum, and *it should be illegal for anyone to apply the simultaneous method.* Under such conditions no protection is needed, and the immunity produced by the use of serum alone is not economically justifiable, while the use of virus no doubt infects premises where it is used and thus centers of infection are established in a cholera free zone."

This would seem definitely to support the stand taken by this division, that is, that hog cholera virus should not be introduced here unless a virulent form of hog cholera should make its appearance and spread to many herds in the Territory.

From Maui Dr. Fitzgerald reports that he has had good success with the serum treatment at the Grove Ranch outbreak,

while a few cases continue to appear on the Haleakala Ranch. On Hawaii a few scattered cases have occurred but no outbreak of any importance has been reported.

#### CEREBRO SPINAL MENINGITIS OR FORAGE POISONING.

Referring to the outbreak in a plantation stable on this island, reported on last month, only one more animal became affected, since which time the disease seems to have died out. The total loss was therefore eleven mules and two horses, which constitutes the largest outbreak occurring here for a number of years. The samples of feed forwarded to Prof. Rock of the College of Hawaii for examination were found, so far as the barley was concerned, to contain a large amount of various fungi which, in Prof. Rock's opinion, made it absolutely unfit for use as a feed. The bran, on the other hand, was found to be in good condition. A copy of Prof. Rock's letter has been forwarded to the manager with advice that the balance be not used as feed for horse stock at least. At a recent visit by Dr. Fitzgerald to Kohala, Hawaii, he was called by Mr. Watt to examine a number of mules which he found to be affected with spinal meningitis. Besides this a few scattered cases have occurred at the City of Honolulu.

#### BOVINE TUBERCULOSIS CONTROL WORK.

Little testing has been done during the past month principally because a number of dairymen are waiting for the passage of a bill before the present legislature providing indemnification for the destruction of tuberculous animals. However, all the she stock on the Waianae Ranch, comprising 240 cows and 100 heifers, together with four bulls, were tested and 20 reactors found. Of these 344 head at least one-half had never been tested before, while of the 20 reactors only three head showed earmarks indicating a previous test. Only one of the bulls reacted.

Until some definite conclusions have been reached in regard to future testing, it is the intention of this Division to confine this work to dairymen and cattle owners who apply for the test, unless other instructions are received from the Board. From the Island of Hawaii Dr. Elliot reports having tested 110 head belonging to different owners, without finding a single reactor. He will begin testing the Honokaa and Paauhau herds next month.

#### IMPORTATION OF LIVE STOCK.

There arrived during the month of March an unusually large number of animals, among which were 149 mules, 97 being quarantined in Honolulu and 52 on Maui. A number of pure-bred hogs for breeding purposes, principally Berkshire boars,

were received, but only three dogs. Poultry continues to arrive in steadily increasing numbers, not less than 131 crates arriving during the month. By far the larger proportion of these consisted of common or cross-bred Leghorns, every crate containing five or six dozen. Of the high class birds may be mentioned four crates of Black Minorcas and a few crates of Buff Orpingtons and Barred Plymouth Rocks.

From Hilo Dr. Elliot reports the arrival and quarantine of 29 mules and one horse, besides five crates of poultry.

Respectfully submitted,

VICTOR A. NORGARD,  
Territorial Veterinarian.

#### REPORT OF ASSISTANT VETERINARIAN.

Honolulu, April 31, 1915.

Dr. A. V. Norgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit the following report for the month of March, 1915:

#### TUBERCULOSIS CONTROL.

The following dairy cattle were tested during the past month:

	T.	P.	C.
Leahi Home .....	2	2	0
Waianae Ranch .....	344	324	20
Capt. Hartman .....	4	4	0
E. W. Williamson.....	6	5	1
J. H. Cummings.....	6	6	0
W. E. Wall.....	4	4	0

From the above list it will be seen that a total of 366 head of dairy cattle received the test out of which number 21 head were condemned and branded.

#### IMPORTATIONS OF LIVE STOCK.

Matsonia, San Francisco: 13 crates poultry; 1 box rabbits, W F X Company; 1 dog, G. A. Marshall; 1 dog, Mrs. Robert Laing.

Sierra, San Francisco: 1 crate pigeons, W F X Company; 3 crates poultry, F. F.

Lurline, San Francisco: 16 mules, McBryde Sugar Co.; 12 mules, H. S. Company, Kauai; 48 mules, Schuman Carriage Co.; 2 Berkshire boars, E. O. Hall & Son; 13 crates poultry. Kahu-

lui—52 mules, Maui Agr. Company; 1 crate poultry; 2 crates poultry, F. F. Baldwin.

Wilhelmina, San Francisco: 29 crates poultry.

Mexican, Seattle: 2 crates poultry, E. W. Jordan.

Manoa, San Francisco: 21 mules, Honolulu Plantation Co.; 10 Merino rams, Hind, Rolph & Co.; 7 Berkshire boars, 1 Berkshire sow, Club Stables; 25 crates poultry.

Dakotan, Seattle: 1 crate poultry.

Matsonia, San Francisco: 31 crates poultry; 1 crate pigeons, 1 crate rabbits, W. F. X. Company; 1 dog, J. B. Laing.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

#### DIVISION OF ENTOMOLOGY.

Honolulu, March 31, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of March, 1915, as follows:

During the month 42 vessels arrived at the port of Honolulu of which 24 carried vegetable matter. Six vessels came by the canal route and were boarded and inspected.

<i>Disposal.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	919	22,122
Fumigated . . . . .	8	8
Burned . . . . .	48	50
Returned . . . . .	8	8
	<hr/> 983	<hr/> 22,188

Of these shipments 21,802 packages arrived as freight, 290 packages through the postoffice and 96 packages as baggage of passengers and immigrants.

#### RICE AND BEAN SHIPMENTS.

During the month 40,560 bags of rice and 2953 bags of beans arrived from Japan, also 220 bags of wheat from the Orient. After a thorough inspection all these shipments were found free from pests and were allowed to be delivered.

## PESTS INTERCEPTED.

Thirty-two packages of fruit and 14 packages of vegetables were taken from the baggage of passengers and immigrants from foreign countries, and were destroyed by burning. One package of rose plants infested with rose aphid was fumigated before delivery. Three shipments of ornamental plants and palms arrived from Florida. These shipments were found infested by scale insects (*Coccus herperidum*), (*Pseudococcus pseudonipae*) and the palm aphid (*Cerataphis lataniae*). Two plants (*Warneria thunbergia*) were badly infested with the citrus whitefly (*Aleyrodes citrifolia*) bearing its fungus (*Aegerita webberi*). After all the shipments were fumigated these two plants were taken out of the shipment and were destroyed. Six packages of seeds, one package of plants and one package of fruit arrived by mail from foreign countries and were returned to original postoffice under the ruling of the Federal Horticultural Board as being unmailable.

## BENEFICIAL INSECTS.

Mr. D. T. Fullaway has continued with the breeding of the various parasites for the fruit and horn fly. During the month particular stress has been given to the recently introduced parasites and their distributions in various sections as recorded by him in the appended report. Added to this was the regular liberation of surplus parasite material of Silvestri's introductions which, owing to the breeding and upkeep, are liberated after certain periods, also the distribution of surplus horn fly parasites for similar reasons.

## HILO INSPECTION.

Brother M. Newell reports the arrival of eight steamers of which five brought vegetable matter consisting of 162 lots and 2000 packages, which were found free from pests and were passed for delivery.

## INTER-ISLAND INSPECTION.

During the month of March 65 steamers plying between Honolulu and the ports of the other Islands were attended to and the following shipments were inspected and passed. Plants, 140 packages; taro, 643 bags; vegetables, 69 packages; fruits, 10 packages; total inspected and passed, 862 packages. The following packages were refused shipment on account of infestation or of having undesirable soil attached to the plants: Plants, 7 packages; fruit, 13 packages; total refused shipment, 20 packages.



I desire at this time to report having received from Mr. W. M. Giffard 34 boxes of pinned insects as a present to the Board of Agriculture and Forestry. These insects represent many of the rare endemic species of our fauna and were collected and mounted by Mr. Giffard during the last ten years. Roughly estimated there are about 3800 specimens, all nicely mounted and labeled, and representing insects from all the islands of the group. This donation adds much to our own collection and supplies many vacancies which would take years to fill.

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

#### REPORT ON PARASITES.

Honolulu, March 31, 1915.

E. M. Ehrhorn, Esq., Superintendent of Entomology.

Sir:—I submit herewith my report on the operations of the insectary during the month of March, 1915:

#### PROPAGATION.

*Diachasma fullawayi*—782 females and 1564 males.

*Diachasma tryoni*—115 females and 230 males.

*Tetrastichus giffardi*—7625.

#### LIBERATION.

*Diachasma fullawayi*—781 females and accompanying males.

*Diachasma tryoni*—28 females and accompanying males.

*Tetrastichus giffardi*—9200.

The *Tetrastichus* was liberated as follows:

Nuuanu Valley, 3800; Insectary, 3700; Maunawili, 500; Puna-hou, 100; Kalakaua Ave., 100; U. S. Experimental Station, 1000.

The African *Diachasma* was liberated as follows:

Nuuanu Valley, 285; Insectary, 293; Maunawili, 8; Kaneohe, 25; Campbell's Piikoi St., 60; U. S. Experiment Station, 110.

The Australian *Diachasma* was liberated as follows:

Nuuanu Valley, 12; Insectary, 8; U. S. Experiment Station, 8.

The number of pupae handled during the period corresponding to the above emergence was 26,200 for *Diachasma fullawayi* and 1739 for *Tetrastichus giffardi*. The percentage of parasitism estimated on these figures is less than 1% for the former and 3% for the latter.

Respectfully submitted,

D. T. FULLAWAY.

## DIVISION OF FORESTRY.

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Honolulu, April 12, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit the following routine report for the Division of Forestry for the month of March, 1915:

## PERMITS.

*Wahiawa grass cutting.* On March 8 a permit was issued to the Hawaii Preservation Co., Ltd., to cut grass on the land of Wahiawa within the Ewa forest reserve, Oahu. The permit, which runs until May 30, and is revocable before then on seven days' notice, requires the exercise of precautions in preventing forest fires and assistance in fighting them should they start, prohibits the cutting and removal of anything but grass, and requires the payment of all damages resulting from any misuse of the permit. The company desired the grass for fertilizer on its pineapple fields and it is being taken from the land in Wahiawa where formerly a severe fire occurred. A local resident has since expressed his opinion that this grass cutting is an excellent thing, because it here grows long and in dry weather becomes as dry as powder and is a great fire menace.

## APPLICATIONS.

*Tantalus.* During the month an application to cut honohono on Tantalus was refused after a personal visit showed that in most places in this forest this herb was very short and was required as a moist, ground cover.

*Awa.* By reference from the Governor, an application was received from J. K. Kapunihana and J. Keola Kuhiike of Keanae, Maui, to take awa from the government forest on Maui. Since the application was indefinite as to locality, and only a part of the land in the Koolau forest reserve, Maui, is under the control of this Board, I at once wrote to the applicants requesting them to inform me of the exact lands from which they wished to gather this root, in order to ascertain whether or not the matter came under our jurisdiction. I also wrote to Messrs. W. F. Pogue and George C. Cooper, of Huelo and Hana, Maui, respectively, who have had experience in the matter of taking awa from the reserves, and have received from them suggestions which will help in taking suitable action on the present application if it is found that the matter is under our control.

*Kukui nuts.* On March 25 an application was received from Geo. H. Rice of Honolulu to take for a term of years fallen kukui

nuts from the lower government lands in the forest reserve in Palolo Valley. If he can secure permission to take kukui nuts from other lands in Palolo as well as from the forest reserve, Mr. Rice plans to establish an oil extraction outfit with the idea of putting kukui nut oil on the market. He believes that he can sell the oil for about the same price as linseed oil—75 cents per gallon. Since I can see no way in which the forest would be injured by the gathering of the fallen nuts and I believe that an industry of this nature should be encouraged, it is my plan to issue, with your approval, a preliminary permit to Mr. Rice for this purpose, making a nominal charge for the nuts of say 5 cents per hundred pounds, this price to be readjusted after experiments have determined how much oil can be extracted from 100 pounds of nuts.

*Kahoolawe.* During the month two applications were received for privileges on the Kahoolawe forest reserve; one from Ed. K. Duvauchelle of Pukoo, Molokai, to shoot goats on the island, the other from W. J. Coelho of Honolulu who desires the sole privilege of occupying the island for 20 years free of rent in order to establish a fishing station, and stock the island with game birds and poultry. In return he would kill off the goats and plant trees on the island. In view of the fact that the former tenant of the island has not yet removed all of his sheep and may claim that he still has rights there, it would seem that these two new applications should not be considered until there is some definite understanding as to future plans concerning the island. With this in view I intend soon to take up the whole question with you in the form of a special report.

#### FOREST FIRES.

A report of forest fires in the woods back of Olaa, Hawaii, during March led me to inquire from District Fire Warden C. F. Eckart of the Puna district as to their extent and he has informed me that there had been four fires in the mauka lands to the southeast of the Olaa section, but that at the end of the month showers had extinguished them. A later report from Mr. Eckart showed that after a personal examination no evidence of fire was found in the forests on government lands or in any other heavily wooded land in that section. The fires had all been on pasture lands controlled by the Shipman interests.

#### HILO FOREST RESERVE.

Concerning the question, referred to the President by the Governor, of a possible elimination for homesteading of land at the northwest corner of the Hilo forest reserve, Hawaii, on the land of Humuula, I found that the matter had been before the Board

in 1907 and 1909, when the Board decided each time that the boundary of the reserve at this point should not be changed, and that the upper edge of the forest should not be opened up. The Governor was informed that the Board saw no reason at present why its former stand on the matter should be changed.

#### FOREST FENCING.

On March 18 the Governor allotted \$20,000 from the water license fund for the construction of forest fences. Since the money is immediately available I have already made inquiries concerning suitable fence wire and with Mr. von Holt's advice have decided to use No. 8 galvanized wire and to call for bids on a sufficient amount to fence 20 miles of boundary, for a beginning. During April I plan to visit Kauai to secure data for specifications to construct the fences needed on that island.

#### SEED FOR CHINA.

The appended report of the forest nurseryman shows the activities in his department during March. To assist in colonization work in China one-half pound of algaroba seed and small packets of seed of 37 other varieties were sent to Professor Joseph Bailie of the University of Nanking, Nanking, China.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry.

#### REPORT OF FOREST NURSERYMAN.

Honolulu, April 12, 1915.

C. S. Judd, Esquire, Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of March.

#### NURSERY.

##### *Distribution of Plants.*

	In seed boxes.	In boxes trans- planted.	Pot Grown.	Total.
Sold . . . . .	1500	...	208	1708
Gratis . . . . .	4000	480	1144	5624
	<hr/> 5500	<hr/> 480	<hr/> 1352	<hr/> 7332

*Realizations.*

Collections on account of plants sold amounted to.....	\$4.95
Total.....	\$4.95

## PRESERVATION FOREST RESERVES.

*Collections.*

Rent of premises at Half Way House, Tantalus, \$10 per month, January, February and March.....	\$30.00
Fee for use of land and gathering Ti leaf on Kalawahine, Pauoa Valley, \$50 per year, Jan., Feb. and March.....	12.50
For use of two acres of land on Kalawahine in Pauoa Valley at \$10 per acre per year, Jan., Feb. and March.....	5.00
Total.....	\$47.50

## PLANTATION COMPANIES AND OTHER CORPORATIONS.

The total number of trees distributed under this heading amounted to 5550. (In seed boxes, 2000; in boxes transplanted, 2800; pot grown, 750.)

## MAKIKI STATION.

The work done at this station has been principally routine, consisting of transplanting into boxes and pots, mixing and sterilizing soil and attending to the plants in stock.

## HONOLULU WATERSHED PLANTING.

During the month 1100 kukui trees were planted. Other work done consisted of hoeing and clearing away weeds and grass from the trees formerly planted. Patches along the Ewa side of Herring Valley will be the next part of the work to be taken up. The Sugar Loaf and Round Top section is practically finished. A new trail from Makiki main valley across the ridge will have to be made for the convenience of the men while at work, also for packing trees.

## ADVICE AND ASSISTANCE.

The writer has been called upon to make visits and otherwise give advice and assistance, as follows: Number of visits made,

13; persons calling for advice by telephone, 11; persons calling at nursery for advice, 15; advice by letter to other islands, 6; total, 45.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

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## DIVISION OF HYDROGRAPHY.

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Honolulu, April 13, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography during March, 1915, is submitted:

### WEATHER CONDITIONS.

Reports from all islands indicate serious conditions of drought. The discharge of East Maui ditches is the lowest on record—a total discharge of about 45 million gallons per day. The mean discharge of these ditches has been about 125 million gallons per day, and the maximum capacity is about 225 million gallons per day. The low discharge of East Maui ditches is typical of practically all other ditches on all islands.

### UTILIZATION INVESTIGATIONS.

Little work was done in this line. A few check measurements were made on Kahuku plantation and for the Heeia Agricultural Company. An attempt was made to make seepage investigations on the ditches of the Maui Agricultural Company and the Hawaiian Commercial & Sugar Company on Maui, but through a misunderstanding the control of the water in the ditches was not satisfactory and the work was postponed.

### KAUAI.

Mr. W. V. Hardy, formerly in charge of Kauai, returned from the mainland on March 13 and resumed charge of the island. The new continuous record stream gaging station installed in cooperation with the Hawaiian Sugar Co. was completed. This station, in connection with the Olokele ditch measurement station, will show the entire run-off from the Olokele upper valley.

Construction work on the new Kapaa river continuous record gaging stations was started and will be completed in April.

Ten stream measurements were made and ten mountain rain gages were visited during the month. A new copper rain gage

of 300 inch capacity will be re-established on Waialeale, 5070 feet elevation, during April.

G. K. Larrison spent March 17 to 20 on reconnaissance in the Kapaa and Anahola river valleys.

#### OAHU.

A large amount of small repair and maintenance work was done. New staff gage faces were put in at 12 stations. Six steel cables and iron parts of cars and equipment were oiled and painted. The location of the three new coöperative stream gaging stations to be built in coöperation with the Koolau Agricultural Co. in the Punaluu and Kaluanui stream basins was decided on and construction work was started on these stations. Mr. Austin visited 21 stream gaging stations and made 21 stream and ditch measurements at regular stations, and five miscellaneous measurements. Mr. Kimble, assistant engineer, left for the mainland on the March 8 transport on leave. His resignation from the service will take effect March 31, 1915.

#### MAUI.

Outside of a few seepage measurements made on the Maui Agricultural Company and the Hawaiian Commercial & Sugar Company ditches, which were not successful, only routine work was done. All continuous record stream gaging stations were visited, and two stream measurements were made.

#### HAWAII.

On March 31, G. K. Larrison accompanied the deputy attorney-general to Waimea, Hawaii, to gather evidence for the Territory in connection with the Waikalua water case which is soon to be brought to court.

#### APRIL PLANS.

In addition to routine operation and maintenance work, the following special work is planned:

*Kauai*.—Complete Kapaa measurement stations above homesteads.

*Oahu*.—Complete Punaluu and Kaluanui coöperative stream measurement stations.

*Hawaii*.—Complete special hydrometric work for the attorney-general's office in connection with the Waikalua stream waters.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

## HEN FLEAS.

*Xestopsylla gallinacea* (Westw.).

By J. F. Illingworth, Ph. D., Professor of Entomology,  
College of Hawaii.

Apparently these fleas are rather recent arrivals in the Territory; the entomologists not having noticed them prior to 1913. The earliest specimens in the College collection were taken in November of that year. It would be interesting to know just when and how they were brought in, and how widely they are distributed in these Islands. Looking to this end, the College of Hawaii would welcome any definite information, on these points, from poultry owners or others. Just a postcard, stating when you first noticed the fleas and giving the locality, will assist greatly in making the survey.

Unlike ordinary fleas, this species has a habit of attaching itself, permanently, while feeding; hence they are easy to catch, although hard to pull off from the skin. They have been called the "hopless flea," but this is a misnomer, at least, when they are not attached. Active specimens are able to jump out of a jar 5 inches high.

## HOSTS.

Although these are called the hen fleas and their normal hosts are poultry, they will, apparently, attack any other animals that come within their range. They have been recorded from dogs, cats, horses, rats, owls and man. They are particularly fond of young animals, and, hence, sometimes very annoying to children. Young cats and dogs often have their ears covered with them. In East Africa it was found that 22.5 per cent of the fleas attacking rats belonged to this species, hence, they were thought to be an important agent in the distribution of this pest. Recently, the writer discovered that the English sparrows, that flock in the chicken houses to the feed boxes, are also infested; and these may act as a rapid agent of carrying them from house to house.

## DISTRIBUTION.

Although Westwood described this species as an inhabitant of India, in 1874, it is now pretty generally distributed around the world; favoring tropical and sub-tropical regions. It has been recorded in the southern U. S. since 1890; and one record extends as far north as Minnesota. Since these fleas are found in California it is quite probable that they came to us, on poultry, from the Coast.



## LIFE HISTORY.

The development of this species resembles that, already known, of other common fleas. The earlier writers on the hen flea supposed that eggs might be retained and hatched within the body of the parent, as is the habit of the Jigger Flea (*Sarcopsylla penetrans* L.), of the Southern States. We have been able to trace through the entire life cycle, and hence can work more intelligently in combating them.

The female fleas remain attached after they have found a suitable host, the eggs being dropped as fast as they are produced. Evidently the egg laying goes on very rapidly at night, for the roosting board, under infested fowls, is always thickly covered with them, in the morning. The eggs are very small, of course, and resemble small white specks, just visible to the naked eye. With a lens they appear as beautiful, pearly white, oval objects, about one-third longer than wide. Fleas removed from the hens and placed in vials produced eggs at once; using these, the incubation period was easily determined—the young hatching in  $3\frac{1}{2}$  to 4 days.

Some difficulty was at first experienced in feeding the larvae, until it was discovered that they, too, like other common species, live on dried blood particles in the dust. Examining the attached fleas, the writer saw that the blood of the fowl was rapidly passing through them, and being dropped in the form of small coagulated pellets. It had already been noticed that the food in the stomach of the larvae, collected on the roosting board, showed through the skin, a dark-red color, and the literature on other species indicated that they possibly feed upon this excrement of the parents. In the test tubes containing these dry pellets of blood, mixed with the dust, the fleas were easily reared to their adult stage.

The larva is a small, wormlike creature, and even when fully developed is only about 3 mm. in length. Normally, they are covered up in the dust, but if they are stirred up, and placed on top, they quickly wriggle in again. When ready to pupate the larvae become pearly white, with the alimentary canal empty and the body stored with fat. The larval period was found to vary considerably—lasting from 6 to 10 days. When ready to pupate the larva spins a delicate cocoon, of the finest silk, which holds the particles of dust together, about it. Often the cocoons were made against the side of the glass tube, so that one could see through and note the transformation inside. After building the cocoon the larva rests from 3 to 4 days, doubled up inside, before pupating. The pupal stage lasts from 6 to 9 days; the pupa beginning to turn dark several days before emerging. Thus the entire life cycle from egg to the adult fleas takes from 3 to 4 weeks.

## CONTROL.

The writer recently discovered that the small brown ants (*Pheidole megacephala*) were mortal enemies of these fleas. They were seen swarming over the roosting-board and carrying off both the eggs and the larvae of the fleas. This ant is already recognized as a most valuable friend, from its habit of destroying the larvae of house flies, as well as many other destructive pests.

The water treatment, used against the larvae of ordinary fleas, has proved most effective for these. Soon after discovering the infestation of his hens, the writer began using the hose, washing out the hen house every morning. Within a week the fleas on the chickens became noticeably less; and after two weeks treatment they practically disappeared. The idea is, that the young cannot exist under moist conditions, and, if the larvae are kept from developing, the fleas on the fowls will soon disappear; there being no newly emerged ones to take the place of those that die and drop off.

Investigation showed that most of the reports of infestation came from dry localities, and it was found that our wet districts are not troubled. Using the water treatment, however, one must recognize that the fleas are apt to breed in the dust in the yards as well as in the roosting place. If these is a place where the fowls dust themselves, it should be thoroughly wet down, at least once a week—a light sprinkling of the surface is not sufficient.

In the case of house animals such as dogs or cats, that become infested, creolin can be used with good results. A 5 per cent solution may be used for spraying their houses, bedding, etc. This same treatment may prove valuable in ridding dwellings of fleas, where a free use of water is not practicable. For the treatment of the animals, themselves, weaker solutions should be used as follows:

For dogs, 3% sol.—about 5 teaspoonsful to a quart of water. Cats, fowls, etc., 2% sol.—about 3 teaspoonsful to a quart of water.

---

A FRUIT FLY ATTACKING PAPAW FRUITS.

The Journal of Agricultural Research for September 12, 1914, published by the U. S. Department of Agriculture, contains an article entitled Papaya Fruit Fly. The papaya of the Southern United States is the West Indian papaw (*Carica papaya*), and as this plant has some importance from an economic point of view, in certain of these islands, a brief abstract of the paper mentioned above, which appears under the joint authorship of Messrs. Frederick Knab and W. W. Yothers, may be of interest to readers of the Agricultural News, says the latter journal.

The insect which forms the subject of this paper is *Toxotrypana curvicauda*, Gerstaecker. It was first brought to the notice of the U. S. Department of Agriculture in 1905, when it was bred from a maggot-infested papaw fruit, from the subtropical plant introduction field station at Miami, Florida. Since that time, the increasing importance of the papaw as a possible commercial crop has led to investigations in connection with this insect.

The papaw fruit fly is now recorded as occurring in the southern part of Florida, in Costa Rica, Yucatan, Brazil, Peru, Porto Rico, Bahamas, and St. Jean (? St. Jan) Danish West Indies. It is stated that this last record has been erroneously given at St. John, Antigua.

**Description**—The adult papaw fruit fly (*Toxotrypana curvicauda*) belongs to the dipterous family Trypetidae and exhibits a certain superficial resemblance to a common brown wasp (Polistes). This is due not only to its similarity of size, form, and general coloration, but in life this is accentuated by the manner in which it walks about on the fruit, with its body well elevated upon its slender legs, and by a certain nervousness of movement. The female is remarkable for its long and slender curved ovipositor, which exceeds the length of its body.

**The egg.** The eggs were procured from gravid females by dissection. The number of eggs produced by a single female appears to be slightly in excess of 100; the counts from two females, both showing a distended abdomen and probably containing a nearly full complement of eggs, gave 103 fully developed eggs in each case. No eggs in process of development were present, which indicates that all the eggs are disposed of within a short period.

**The larva.** The larvae are shining, dirty, greenish white in color while feeding upon the interior seed mass. Larvae that have matured within the ripened fruit, and that have penetrated into the meat, are the same rich golden yellow color as the ripe fruit.

**Habits of the larvae.** The larvae of the papaw fruit fly occur in the interior of the fruit, first feeding in the central seed mass, but later, as they mature and the fruit ripens, working into the meat and ruining the fruit. The number of larvae in a single fruit varies from two or three to twenty or more. Sometimes larvae of different sizes occur in the same fruit at the same time, showing that the infestation was from more than one oviposition.

Cultivated fruit has been found to be generally less infested than that growing wild, and this is ascribed to the fact that the flesh of the cultivated fruits is usually thicker, the thin-fleshed varieties appearing to be more generally attacked. It seems that the eggs are deposited inside the seed cavity, or at least the insects develop best when this happens. Thick-fleshed fruit often

showed numerous scars, indicating attempts at oviposition, when no injury to the seed mass or the flesh occurred to indicate the feeding of the larvae. On the other hand, fruits were noticed, in which fully grown larvae were found dead. This is explained as being the result of an attack on fruits which were too young. The contact with the juice of the unripe fruit is quickly fatal to the larvae. It is evident that the fruit was too young when attacked, and that the maggots became fully grown and attempted to penetrate into the flesh before it was sufficiently ripened, and they were killed by contact with the juice. In the ripe fruit the flesh is softer, and the gummy juice is no longer exuded.

**Pupal period.** The larvae when full-grown usually leave the fruit and fall to the ground, where they pupate, under some bit of rock or buried in the soil at a depth of one or two inches.

The length of the pupal period is given as seventeen to twenty-one days in Porto Rico, and from thirty to forty-two days in Florida. The latter figures were obtained as the result of observations in the cool season of the year.

**Habits of the adult and oviposition.** The adults of this species appear only for a short time just before sunset. A female fly was observed to alight on a well developed but unripe fruit. After walking about a little she inserted the ovipositor its full length into the fruit. As soon as the rind was punctured, the milky juice which the unripe fruit exudes whenever injured welled forth and began to trickle down over the surface. It is evident that the female fly endeavors to thrust her ovipositor through the flesh to deposit the eggs in the central seed cavity, and that it is only in those varieties with the thinner-fleshed fruit that this is successfully accomplished. The larvae are always found in the seed mass, except when they are full-grown and the fruit is ripe, when they penetrate into the flesh with the object of working their way to the outside in order to get to the ground and pupate.

**Food plants.** Up to the present time no other fruit than the papaw has been recorded as being attacked by this insect, and all attempts to introduce the larvae to feed on other fruits have, so far, failed.

**Rapid increase of the fruit fly.** During the last two years the papaw fruit fly has rapidly increased in abundance, and has extended its range so as to threaten seriously the future development of the papaw industry in Florida. This is largely a result of the increased cultivation of the papaw in the southern part of the State. Some varieties of Philippine stock producing large fruits are apparently free from attack.

**Control.** It has been pointed out that fruit with very thick meat escapes infestation. While the papaw fruit fly attempts to oviposit on such fruit, the thickness of the meat prevents the tip of the ovipositor from reaching the seed cavity, and in the meat itself the larvae cannot live. It was further found that in some

fruits the larvae had reached maturity before these had ripened, and had been killed by the sticky juice of the green fruit in endeavoring to escape. The means of control that now seem valuable are the production of varieties of papaw that have thick meat and that ripen slowly, and the conscientious destruction of adventitious or wild papaw plants, and of all infested fruits. All plants with inferior fruit should be eliminated. H. A. R.

### THE PRODUCTION OF THYMOL.

In the issue for January 13, 1915, the Times calls attention to the fact that hitherto the well-known antiseptic thymol has been manufactured in Germany, notwithstanding the fact that ajowan seeds, the sole source of commercial thymol, are grown in India.

The plant which produces ajowan seeds belongs to the natural order umbelliferae, and is known as *Carum copticum*. The plant is cultivated from Bengal and the Punjab to the South Deccan. It appears that two products are obtained from the seed, but the 'Ornum water,' which contains the thymol, is the more important.

Thymol is a better antiseptic than phenol (carbolic acid), being less irritant in its action on wounds. Thymol is also a useful medicine for the expulsion of intestinal parasites, being largely employed in cases of ankylostomiasis.

Perhaps ajowan seed might be profitably cultivated as a minor industry in the West Indies; though, of course, the point in question at present is not one of production, but one of manufacture. —*Agricultural News*.

### EFFECT OF THE TROPICS ON THE BLOOD.

The question of the influence of a tropical climate upon the blood of children of European descent is dealt with in the Annals of Tropical Medicine and Parasitology (December 15, 1914), in a paper by A. Breinl and H. Priestley, of the Australian Institute of Tropical Medicine. The investigation on which the paper is based was carried out in Queensland, and some very interesting results, possibly applicable in the West Indies, were obtained. It is worthy of note that previous investigations on the same subject have led to more or less contradictory results, but the present conclusions, being based on a large number of observations, may be considered as fairly well established.

The conclusions are as follows: Careful blood examinations performed on 574 school children in Townsville, Queensland, of European descent, of ages between seven and fifteen years, of whom the majority had been born and had resided in Tropical Queensland during their whole life, indicated (1) that the average number of red blood corpuscles is not diminished when compared with analogous figures for children born and bred in a

temperate climate; (2) that the average haemoglobin content of the blood is normal; (3) that the number of leucocytes (white corpuscles), is slightly increased; (4) that the average blood pressure does not show any difference from that of normal children in temperate climes.—*Agricultural News*.

### THE INDIAN OIL PRESSING INDUSTRY.

That the oil-seeds industry is one of the important industries of this country will be realized when it is seen that in the Bombay presidency (inclusive of Sind) alone there are nearly 4,00,000 acres—not 400,000 as mentioned in the government resolution on the reports—of these seeds under cultivation, and the value of the export trade in 1912 amounted to over 520 lakhs of rupees. The chief seeds from which oil is extracted in the country are the cotton-seed, ground-nut, castor-oil seed, rape-seed, linseed, poppy-seed, and mowra-seed. Linseed alone is exported from India to the value of over 420 lakhs in a year, while the value of mowraseed exports reaches 240 lakhs, castor oil-seed 123 lakhs, rape-seed 92 lakhs, ground-nuts 92 lakhs and cotton-seed 73 lakhs. The importance of the oil-seed industry to the country is thus apparent. But, as every one knows, instead of these seeds being pressed in this country and the oil exported to western countries, India has been exporting the raw material in large quantities, allowing the oil to be pressed and refined outside the country, thus losing a source of immense profit. The Bombay Presidency imported vegetable oils to the value of nearly six lakhs of rupees in 1912-13—oils which, if the necessary facilities had been forthcoming, could have been manufactured locally. The indigenous oil-pressing industry in this presidency is an old one, as everywhere else in India, and, though the methods may be crude, it plays an important part in the economy of the country. Mr. Pandit calculates the total daily output of the *ghanis*—the indigenous oil-pressing machinery—at 155 tons. He also thinks that the *tehi*—the native oil man—will be able to hold his own for a long time to come, in spite of the introduction of power machinery from the west. Mr. Pandit, however, says that the economic condition of the workers is generally far from satisfactory, chiefly on account of the high prices ruling in the land.—*Indian Agriculturist*.

Do not waste feed on unprofitable stock. It is only when the returns show a profit over cost of production and keep that birds should be retained.

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Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

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The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

**G. K. LARRISON,**  
Superintendent of Hydrography.

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JUNE, 1915

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All communications in regard to seed or trees should be addressed to David Haugis, Forest Nurseryman, Box 207, Honolulu, Hawaii.

C. S. JUDD,  
Superintendent of Forestry.

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### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications to  
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EDW. M. EHRHORN  
Superintendent of Entom.

# THE HAWAIIAN FORESTER & AGRICULTURIST

VOL. XII.

JUNE, 1915.

No. 6

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## COÖPERATION EXPOUNDED.

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Coöperation among small farmers in Hawaii has for many years been advocated by the Forester. A movement has just been started for the coöperative marketing of fresh pineapples on the mainland, to relieve a condition of over-production in raising that fruit here for the canneries. Some shipments have gone forward in steamers within the past few weeks. For the benefit of Hawaiian homesteaders who may be considering further development of the coöperative idea here, in this number we begin reprinting a circular on the subject in general, issued by the college of agriculture of the University of California. It is by G. Harold Powell, general manager of the California Fruit Growers' Exchange; former assistant chief of the bureau of plant industry, and former pomologist in charge of fruit transportation and storage investigations, United States department of agriculture.

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## REGARDING PAPAIN.

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Much attention is being given to the growing of the papaya and the manufacture of papain by the tropical press. There is an article of six pages, by H. F. Macmillan, on the dual subject in the March number of the Tropical Agriculturist of Ceylon, in which the interest lately shown in the question of making papain in Hawaii, evidenced by an experiment station pamphlet, is mentioned. Under the subhead, "Properties of Papain," the article says:

"The peptonizing or digestive power is well known, and it is considered a good substitute for animal pepsin, but, unlike the latter, it requires neither the aid of an acid nor an alkali to convert the contents of the stomach into a peptone. The celebrated chemist Vauquelin compared papain to 'blood deprived of its coloring matter.' The material has not, however, come into extensive use in medicine, its consumption at present being chiefly confined to America, where it is much used in the treatment of chronic dyspepsia, gastritis, diphtheria, etc., and it is also recommended for eczema. In Ceylon it is not used medicinally, except perhaps in native medicine. It is described, however, in Waring's

Indian Pharmacopœia and Dymock's *Materia Medica* of Western India. Papain has the effect of curdling milk, like rennet, and might be used as a substitute for the latter. The demand for papain is, of course, limited, and the present supply appears to come almost entirely from Ceylon and the West Indies, more especially the island of Montserrat."

It is stated that the United States is the largest consumer of the article, importing it annually to the value of more than \$75,000. The price paid in the States varies from \$1.50 to \$3 a pound, according to quality as tested to determine its digestive properties. Mr. Macmillan concludes his treatise as follows:

"Opinion among large consumers appears to be divided on the present question of the supply and demand, for while some state that the consumption of the drug is on the increase and the prospects are good for marketing larger quantities, others affirm that the only means of extending the market would be in the production of a more carefully-prepared product which would replace the cheaper and adulterated grades, of which considerable quantities are sold. In the course of an article on papain in the *Journal of the Royal Society of Arts* (September, 1913), the statement was made that

"The United States prefer the inferior qualities from the West Indies, and also desire a white or bleached papain, which the Ceylon natives are not always in a position to supply. Importers, however, could, without much difficulty, procure an almost unlimited supply of the best unadulterated Ceylon papain if they were willing to pay a slightly better price for it than for the West Indian product, and would accept it in its natural state."

"Dr. Huybertsz of Kandy, who has devoted some attention to the preparation of papain, states that 'European and American importers object to papain in its natural color, and insist that it be white, or at least light. This, he says, is a great mistake, as it can only be obtained by bleaching—a process which sacrifices therapeutic efficiency for pharmaceutical appearance. Genuine papain is slightly saltish and somewhat acrid. It has a peculiar, unmistakable smell, and the 'feel' of granular papain should be crisp, like biscuit, and easily crushed between the fingers. When it is doughy or sticky it has been adulterated or badly prepared. It has also slight escharotic action, and collectors of the fresh juice frequently blister their fingers. When mixed with water it has a soapy feel.' Up to a comparatively few years ago the value of papain was little understood, and it was mostly used in making mucilaginous products and chewing-gums. Since then the United States, Germany and Great Britain have taken considerable quantities, and it enters into many preparations. Recently America has found a new use for the drug, but what this is has not yet transpired."

## BULLETIN ON BABY BEEF.

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The Nebraska Experiment Station issued Bulletin 143 on "Feeding Baby Beef" at the North Platte Substation. This bulletin gives the results of fattening five lots of calves on different forage and grain rations during the winter of 1911 and 1912 and a duplication of this test during the following winter.

The calves were spring calves put into the feed lots shortly after weaning in the fall and fed until after the middle of June. They were about fourteen months old when sold. The average weight on the market was about 850 pounds. The average selling price was \$68.45 per calf.

The rations fed were as follows:

Lot 1—Prairie hay, corn 9 parts, and cottonseed cake 1 part.

Lot 2—Alfalfa, prairie hay, and corn.

Lot 3—Alfalfa, silage, and corn.

Lot 4—Prairie hay, silage, and corn.

Lot 5—Prairie hay, silage, corn 9 parts, and cottonseed cake 1 part.

The net profit per calf including the profit on hogs fed with the lots was as follows:

Lot 1—Fed prairie hay, corn 90 per cent, and cottonseed cake 10 per cent. Profit per calf, \$17.05.

Lot 2—Fed prairie hay, alfalfa, and corn. Profit per calf, \$20.28.

Lot 3—Fed alfalfa, silage, and corn. Profit per calf, \$22.21.

Lot 4—Fed prairie hay, silage, and corn. Profit per calf, \$11.77.

Lot 5—Fed prairie hay, silage, corn 90 per cent, and cottonseed cake 10 per cent. Profit per calf, \$13.82.

The ration composed of alfalfa, silage and corn gave the fastest and cheapest gains and the most profit per calf. The ration of alfalfa, prairie hay and corn ranked second. The two rations containing alfalfa gave much better results than any ration not containing alfalfa.

Silage had a much higher value when fed with alfalfa than when fed in rations without alfalfa.

Cottonseed cake was profitable when fed in rations that did not contain alfalfa, but was not profitable when fed in rations with alfalfa.

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One of the most striking evidences of agricultural advancement in the Philippines is the Philippine Agriculturist and Forester, a magazine published by the student body of the college of agriculture at Los Banos, Laguna. In one number is found a graduating thesis on the cultivated root-producing aroids, to which the native Hawaiian "staff of life" taro belongs—an article of fourteen pages of cyclopedic information, including many

recipes for cooking the tubers. The number following that just mentioned contains advice to coconut planters in connection with the crisis in the industry produced by the war. "During recent years," the article says, "with the great development in Europe of industries which required great quantities of coconut oil, the price at which copra was once produced at a moderate profit has doubled and the growers of coconuts have grown wealthy." It goes on to say that the countries that bought Philippine copra are at war and their industries prostrated, so that they cannot use copra and will not buy it at any price, and, even if the war should be short, it will be a long time before the buying power of those old customers will be regained. In consequence, there will be a market for good copra and practically none for a poor article. The advice of the writer is to avoid cutting nuts off the trees, but instead let them drop off with sheer ripeness, as they will, thereby saving the expense of removing them artificially from the trees, as well as ensuring uniformly good copra. It is pointed out that good copra cannot be made from unripe nuts, and that good copra can be kept for a number of months without considerable deterioration.

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#### AN INTERESTING CAVE AT MAKAPUU HEADLAND, OAHU.

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By VAUGHAN MACCAUGHEY, College of Hawaii.  
(With Chemical Analyses by FRANK T. DILLINGHAM.)

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#### Four Illustrations.

The Makapuu region is the extreme eastern portion of Oahu. It is well known by the great flashing light and lighthouse that stands high upon its barren cliffs. This arid headland is 642 feet high and marks the eastern terminus of the deeply-eroded Koolau Range. The wind-swept precipices are cut sheer through the innumerable superimposed lava-sheets that constitute the body of the original great Koolau dome. The vertical profiles of these ancient basalt streams are strikingly revealed (Fig. 1). Vegetation is exceedingly sparse and scattered; *Schiedea globosa* Mann, *Euphorbia cordata* Meyen, *Lepidium Oahuense* Ch. & Schl., and *Lipochaeta integrifolia* Gray, are representative plants. Well above high tide mark there is a broad wave-cut platform or shelf, varying in width from ten to sixty feet (Fig. 1). It is possible to walk along this platform, with the heavy surf on one hand and on the other the beetling naked cliffs.

While engaged in a three-day visit to this interesting region, during February of 1915, our attention was called, by Mr. Beasley, the lighthouse-keeper, to a remarkable cave near the





FIG. 1. Makapuu Headland coast, showing cliffs, platform and surf. Note the dip of the lava sheets; the absence of vegetation; the wave erosion.

sea. There are numerous caves in these Makapuu cliffs, some at sea level, and others at higher elevations, but this particular cave is quite separate from the others, both in location and in characteristics. We made a somewhat careful examination of this cave, collected a considerable number of specimens, and took a series of photographs, several of which are reproduced herewith.

The cave is situated in the east face of the Makapuu Point



FIG. 2. The mouth of the cave. Note talus slope; basalt ceiling, and powder deposit on floor.

cliff. It is about 80 feet above sea level, and some 400 feet below the crest of the cliffs that rise directly above it. An extensive talus deposit slopes from the mouth of the cave down to the rocky platform already described. This deposit is composed of large sharp-edged blocks of basalt that have dropped from the cliff, mingled with fine detritus (Fig. 2). The mouth of the cave, shown in the figure, is about 50 feet long by 12 feet high. The cave is lenticular in profile, the basalt ceiling sloping gradually to the floor. The structure of the lava sheets that roof the



FIG. 3. Interior of the cave, showing floor and ceiling. The mouth of the cave is to the right.

cave has been exposed by vertical erosion to easy examination. These sheets vary in color, black, brown and gray predominating, with an occasional stratum of bright brick red. The flows also vary considerably in texture and in extent of disintegration.

The interior of the cave is shown in Fig. 3. The floor is deeply covered with a very fine-grained brown powder or dust. Here and there is a block of lava that has evidently dropped from the ceiling. The powder is very light in weight, and some-



FIG. 4. Interior of the cave; collecting crystals.

what adhesive (as though not entirely dry). It covers the floor to a depth of from one to six inches, and is evidently the result of protracted deposition. Our first thought, upon examining this material, was of guano, but a further examination of the cave gave no evidence that it was now or ever had been used as a sea-bird habitat. There were no traces of nests, roosting places, or the other customary evidences of a guano cave.

The irregular ceiling proved to be almost entirely covered with a crystalline layer that was obviously still in process of forma-

tion. This layer varied in color from snow white to rich iron-sulphate green; in texture from very fine-grained "rice paper" texture up to flat knife-edged crystals several millimeters broad; and in thickness from thin bubbles that shattered at the merest breath, to stout crystalline stalactites the size of one's thumb. It required close inspection to make out the full beauty and delicacy of this "living" ceiling (Fig. 4). All of this crystalline material was quite moist with the water of percolation. It undoubtedly has been formed wholly through the seepage of surface water down through the lava sheets, and ultimate deposition on the ceiling of this cave. The extensive ceiling deposit thus gave us the clue to the impalpable powder that covers the floor; for the latter is evidently the *fragmenta*, accumulating through long periods of time, from the crystalline growth above it.

Professor Frank T. Dillingham of the College of Hawaii kindly made a chemical examination of this material, and reported as follows:

The deposits found as stalactites or coatings on the roof of the caves proved to be composed almost entirely of *gypsum*. There were also found to be present small quantities of iron, magnesium, silica, phosphoric acid and organic matter.

These deposits proved to be almost entirely soluble in hydrochloric acid.

The deposit found on the floor of the caves was light brown in color, and dry and powdery in consistency. Crystals of gypsum could be detected in it.

This deposit was found to contain considerable gypsum, and small amounts of iron, magnesium, phosphoric acid and organic matter. It appears to differ from the first mentioned deposits chiefly in containing a large quantity of matter insoluble in hydrochloric acid.

Apparently this deposit is derived from material brought down from the roof by disintegration or by percolation and subsequent evaporation.

*Statement of results of analysis of the floor deposit:*

1. Moisture .....	11.06%
2. Insoluble residue .....	48.35
3. Gypsum .....	21.40
4. Combined iron and aluminum as oxides ( $\text{Fe}_2\text{O}_3$ $\text{Al}_2\text{O}_3$ ) .....	8.80
5. Total phosphoric acid ( $\text{P}_2\text{O}_5$ ) .....	0.51
6. Undetermined (organic matter, magnesium, and silica) .....	9.88
	<hr/>
	100.00%
7. Total nitrogen .....	.12

## FUNDAMENTAL PRINCIPLES OF CO-OPERATION IN AGRICULTURE.

By G. HAROLD POWELL.

*(Circular of College of Agriculture, University of California.)*

The coöperative organization differs fundamentally from the capital stock corporation conducted for profit. A capital stock corporation for profit is organized to return an earning and a profit on the capital used in the business. The basis of administration, control and the distribution of earnings is the capital invested in the undertaking. In a coöperative organization, the basis of control is the membership, where each votes equally irrespective of the volume of his business; though the basis of control is often made the product of the members, where each votes in proportion to the volume of business contributed, while the earnings in either case, if they occur, are returned to the member in proportion to the volume of business he transacts through the organization. The basis of the coöperative organization is men; of the capital stock corporation, money. Capital cannot coöperate; products cannot coöperate; only men can coöperate. When the degree of coöperation of a member is measured by the capital or the volume of business contributed, then the members as men are not coöperating; either capital or a product is the basis of coöperation through the member as the medium.

### CONFUSION IN THE USE OF THE TERM "COÖPERATION."

There is much confusion in the use of the term "coöperation" as applied to agricultural efforts. It is commonly applied to any group of farmers who associate themselves together. They may organize as members of a voluntary unincorporated association of individuals; or as an incorporated capital stock association to handle farm crops for profit or for other purposes, or as non-profit corporations without capital stock. In California, for example, the term is applied to both profit and non-profit corporations organized to handle farm products, whether organized and controlled by the producers themselves, or by others. In other parts of the country, the same uncertain use of the term is applied to various kinds of agricultural movements. The term needs to be defined by the federal and state statutes. It is believed that its use as applied to business organizations in agriculture should be restricted to incorporated associations, societies, exchanges, or agencies which are formed exclusively for the benefit of the members; whose voting power is based on equality of membership; whose membership is confined exclusively to

active producers, the membership ceasing to exist when the producer withdraws from the organization, and whose earnings are distributed on the basis of the product, rather than on the capital contributed by each member, after a fair rate of interest is paid for the use of capital actually employed in the business, if any, and other overhead charges are deducted. A co-operative organization, therefore, is not a corporation in which the capital is contributed primarily in order that it may earn a profit; nor one composed of producers and non-producers; nor one in which the producer's product is handled by a corporation for the benefit of the stockholders rather than for that of the members; nor one in which the producer's product is handled by a corporation for the benefit of the stockholders rather than for that of the members; nor one in which the membership is not under the control of the organization; nor one in which the members do not actually control the organization. It is an association of farmers who unite in an effort to handle their common interests through an agency which is controlled by them, on the principle of an industrial democracy, and exclusively for their benefit.

#### FORMS OF COÖPERATIVE ASSOCIATIONS.

A coöperative association may be incorporated as a capital stock corporation or as a non-profit corporation without capital stock. If formed as a capital stock corporation it may still be legally coöperative if the laws under which it is formed permit the members to manage its affairs along coöperative lines, or if the statute provides the method of voting, the method of transferring stock, the limitation of membership and the distribution of earnings according to coöperative principles. There has been little effort by the states to enact laws that will permit the organization of purely coöperative associations of farmers. It is therefore impossible in most states for an association to be formed that can operate securely along coöperative principles, though as a matter of fact many associations so formed do, by the consent of the stockholders, actually operate coöperatively.

#### A STOCK CORPORATION NOT THE FORM FOR A COÖPERATIVE ORGANIZATION.

The stock corporation as defined by the statutes of most states is not the form under which to incorporate a farmers' business organization, though most of the so-called coöperative associations have been incorporated under the stock corporation statutes. The stock corporation laws have been enacted primarily to meet the needs of capital, not primarily for the benefit of those who may use the facilities of the corporation. The membership in such organizations is not under legal control, because the right to sell the stock is a legal incident of its



ownership. A stockholder may sell his farm and continue to be a stockholder in a stock corporation and still have the right to examine the affairs of the association, or he may sell his stock to some one who is not interested in the organization, or who may even be antagonistic to it; or he may withdraw his membership and still remain a stockholder. There is no legal way by which the stock, and therefore the control of the corporation, can be confined to the membership after the stock has once been issued, unless the association is able to take over the stock and hold it as a trustee, until it can be re-sold to a member. Neither is the voting power of the stockholders under control in a stock corporation, because the voting power is generally proportional to the number of shares held by each stockholder.

As a matter of fact most of the so-called coöperative associations of the country have been incorporated as capital stock corporations in the absence of other statutes under which they could be incorporated and many of them operate by mutual agreement expressed in the articles of incorporation, or in the by-laws, on strictly coöperative principles: others vote in accordance with stock ownership, fix a maximum amount of stock to be owned by any member, and apportion the stock on the bearing acreage of the members, but make no profits on capital. These organizations usually provide that a withdrawing member shall offer his stock to the association before he can sell it outside, a provision that is useless if the association is not able to take it over.

They may provide also that all the earnings shall be returned to the members pro-rated on the business transacted by each after interest is paid on the capital invested and other overhead charges are deducted. The stockholders may vote equally by agreement and the capital invested may be paid only a fair rate of interest for its use. The difficulty in such organizations lies in the fact that some of the conditions to which they agree are not, in case of trouble, enforceable in the courts, and the organization ceases to be co-operative when the stockholders desire for any reason to exercise their legal privileges along noncoöperative lines.

As a result of organizing a so-called coöperative association under the usual stock corporation laws, many of these organizations often pass into the hands of non-producers or of rival interests, following the withdrawal of members through the sale of farms and the sale and transfer of stock; or a partial control may be held by dissatisfied stockholders who have withdrawn as members.

#### NON-PROFIT CORPORATIONS.

In other states, especially in California, the statute provides for the incorporation, organization, management and coöperation of agricultural, non-profit associations which do not have capital



stock and whose business is not carried on for profit. These associations issue certificates of membership to each member but the membership cannot be transferred or assigned to any other person, nor is the purchaser of a property of a member entitled to membership by virtue of such purchase. In such associations the basis of voting and the control of the membership is subject to rules made by the association. These associations may accumulate a capital with which to transact business though the capital is not in the form of a paid-in capital stock. It may be accumulated pro rata from the proceeds of the shipments of the members, or in any other way agreed to by the members.

In Nebraska coöperation has been defined and given a legal status. The law says, "for the purpose of this act, the words 'coöperative company, corporation, or association' are defined to mean a company, corporation or association which authorizes the distribution of its earnings in part or wholly, on the basis of, or in proportion to, the amount of property bought from or sold to members, or of labor performed, or other service rendered to the corporation." It differs from the general incorporation law of Nebraska by providing that every coöperative corporation has the power 'to regulate and limit the right of stockholders to transfer their stock; and to make by-laws for the management of its affairs; and to provide for the distribution of its earnings."

In Wisconsin, a law was passed in 1911, Chapter 368, Laws of 1911, which provides for the formation of "a coöperative association, society, company or exchange, for the purpose of conducting agricultural, dairy, mercantile, mining, manufacturing or mechanical business on the coöperative plan." It "may buy, sell, and deal in the product of any other coöperative company heretofore organized or hereafter organized" as a coöperative association. The law provides that "no stockholder in any such association shall own shares of a greater par value than one thousand dollars . . . or be entitled to more than one vote." It provides that the directors shall apportion the earnings, subject to revision by the association at any time, "by first paying dividends on the paid-up capital stock not exceeding six per centum per annum, then setting aside not less than ten per centum of the net profits for a reserve fund until an amount has been accumulated in said reserve fund equal to thirty per centum of the paid-up capital stock, and five per cent thereafter for an educational fund to be used in teaching coöperation, and the remainder of said net profits by uniform dividend upon the amount of purchase of shareholders and upon the wages and salaries of employees, and one-half of such uniform dividend to non-shareholders on the amount of their purchases, which may be credited to the account of such non-shareholders on account of capital stock of the association; but in productive associations such as creameries, canneries, elevators, factories, and the like, dividends shall be on raw material delivered instead of on goods purchased. In case

the association is both a selling and a producing concern, the dividends may be on both raw material delivered and on goods purchased by the patrons." The law provides that no corporation or association doing business for profit shall be entitled to the use of the term "coöperative" as part of its corporate or business name unless it has complied with the provisions of the act.

#### FURTHER DIFFICULTIES IN THE STOCK CORPORATION FORM OF ORGANIZATION.

One of the common difficulties in a so-called coöperative association formed as a stock corporation results from the payment of dividends on the paid-in capital above a fair interest for the use of the capital, especially where the capital contributed by the members is not proportional to their individual shipments. The tendency in such organizations is to pay high dividends on the stock. The stockholders generally demand an unusual earning on the capital contributed. They acquire the dividend habit. They deduct an amount from the proceeds from the product of all members, or from the earnings of the company, to pay the dividend, before returning the proceeds to the growers. In some fruit growers' organizations, dividends of 20, 30, or even 50 per cent have been paid on the capital stock.

The difficulty over the payment of dividends usually arises with a member who is a small stockholder and at the same time a large shipper, or when a stockholder ceases to be an important shipper. A grower becomes dissatisfied when he realizes that the payment of a profit to capital, whether taken from the proceeds of his fruit, or made as an earning on his purchases, are used to enrich a stockholder who has money invested in the corporation but who has not contributed to its success except in the original investment. Another source of trouble in the stock corporation is that the grower becomes dissatisfied after receiving a liberal dividend on his stock, if the business condition of the organization does not warrant its continued payment. In the citrus industry these difficulties have usually been avoided by paying no dividends on the capital, or at least a dividend not in excess of the customary rate of interest.

A farmers' organization that has been organized under the usual stock corporation laws, is on an uncertain foundation, not alone from the lack of control of the membership, but also because of the conflict between the capital and the product of the members whenever the proceeds derived from the latter are reduced to pay an unusual rate of interest on the capital contributed.

There are many so-called coöperative organizations (shrewdly formed) that make an earning for the corporation on the product of the grower by retaining the control of the facilities through which the growers' fruit is handled. The packing houses may be controlled by the organizers and a large dividend paid out of the

proceeds of the product on the capital invested. The purchase of supplies may contribute a profit, low grade supplies may be sold at the price of high grade material, and profits may be made in many other indirect ways. An organization that pays a profit to capital from the growers' product, either for the use of packing facilities or for any other service, is not coöperative. It is a stock corporation, operating for the grower for profit on capital, while a coöperative organization is operated by the producers wholly for their own benefit, the benefits being pro rated on the use which the members make of the organization.

#### A COÖPERATIVE ORGANIZATION MUST SPRING FROM NECESSITY.

*A coöperative organization of farmers must be founded on economic necessity if it is to be permanently successful. The reason for its existence must lie in some vital service which it is expected to perform if it is to have strength enough to live in the face of the competition to which it will be instantly subjected.* It must compete with existing organizations and this competition will be directed towards eliminating it; it will be viciously attacked; every conceivable form of misrepresentation will be levelled against it; the officers will be attacked by insidious rumors concerning their ability or integrity; the banks, especially in the newer sections, may be controlled by competitors, and may refuse to furnish the necessary credit; and every weapon known to competition, either legitimate or disreputable, will be used to put it out of business.

The average producer is not a business man, nor is he skilled in the arts of competitive business. He is naturally a strong individualist. He is slow to delegate authority over his affairs to any one and when he is face to face with the skilful arguments of those who aim to break the organization and keep him working as an individual, he is likely to weaken and finally leave the organization unless he had felt the effect of hard times, a helplessness arising from a combination of those who buy or sell his products, excessive freight, or commission charges, or other forms of oppression. It is an historical fact that the investment of the farmer must have been threatened by existing conditions before he has been able, in the past, to overcome his individualism sufficiently to work with his neighbors in coöperative work. The country is strewn with the wrecks of coöperative organizations that were born prematurely and which died by the wayside, because the farmer himself deserted in the first real conflict with the established agencies that have handled his business. Coöperation, to be successful, must be founded not only on economic necessity, but it must grow through gradual evolution. It must have a small beginning and grow in strength through experience step by step, rather than by leaps and bounds. The fundamental mistake that is being made in many localities is to form a farmers'

organization all at once on the plan of an organization that has taken years to develop. The plan may be sound but a coöperative organization can only succeed when given the unflinching support of the members who through years of experience have acquired an appreciation of the fundamentals that underlie a successful association of this kind. The success of any organization depends on its members, not on its form.

#### THE MEMBERSHIP IN A COÖPERATIVE ORGANIZATION.

The membership in a coöperative organization should be confined exclusively to those who are producers and who, as producers, use its facilities. The members should be acquainted and have confidence in each other. It should never include those who contribute capital alone to it. Many organizations are formed by bankers, fruit dealers, or others who promote an organization for the purpose of making a profit from it. They may be formed in good faith by business men who realize the value of the coöperative movement and who are willing, as a service, and not for profit, to furnish the capital for its organization. The need for such an organization must spring from within, from the necessity of the industry, and not from a desire of a commission merchant, a broker, or of an ambitious manager who sees an opportunity of capitalizing the coöperative movement for his personal benefit. There are many organizations of the latter type that masquerade under the coöperative banner, but which are formed, managed, and controlled either directly or indirectly by those who make a profit on the packing organizations, on the sale of fruit, on the purchase of supplies, on railroad claims or trade rebates, or in other indirect ways. Such organizations are always kept prominently before the growers as coöperative, a situation which, when it exists, is almost *prima facie* evidence that the coöperative features are for the benefit of a few, rather than for all the members.

Membership in a coöperative organization should carry with it a responsibility on the part of the member strong enough to carry it through adversity of every kind. To feel this responsibility, the member must of course feel the necessity for the organization; he must feel that he is a part of it; that the organization is his, developed and managed to promote and protect his interests. If the association is formed by the members to meet their economic needs, this feeling of responsibility pervades the membership; but if the association is formed to promote the welfare of the officers or any other class of people, or if financed by well meaning people who really desire its success, an association cannot depend on the loyalty of its members in time of adversity.

One of the problems that a coöperative association always has before it is keeping alive the interest of its members. They must

be a vital part of the organization. They must take an active part in its development. They must keep posted on the details of the business; the business methods of the organization must be an open book to them. There can be nothing mysterious about the management of the business. Contracts, salaries, trade or other legitimate rebates, railroad claims, profits, or earnings of every kind—these must be of such a nature that every producer can know about them if a coöperative association is to maintain the loyal support and confidence of its members. It must, of course, win that support by the results it accomplishes and these results must be obtained by a business record that keeps free from suspicion regarding the integrity of its methods, and as free as possible from criticism regarding its business efficiency. Every defect of the organization will be kept before the members by its competitors, and imaginary defects created by willful misrepresentation by those who aim to break down the membership, will always be prominently featured.

#### VOTING POWER OF MEMBERS.

In a strictly coöperative organization a fundamental principle should be "one man, one vote." It should be a real industrial democracy in which the members trust each other and lean upon each other's judgment as men. In such an organization neither the capital contributed nor the volume of business transacted should be the basis of the responsibility or influence of the individual member, because neither can coöperate or be made a basis for lasting coöperation. In the European coöperative associations the "one man, one vote" principle is applied as a test to separate the true coöperative associations from the pseudo coöperative. Since coöperation is founded on man, not on capital nor on products, there is no fundamental difference in principle where capital is eliminated and product is substituted as the basis of voting and control. The control of a coöperative association should be founded on the equality of membership, whether the member contributes a large or a small volume of business. It is the members who, as men, coöperate in these organizations. The history of the coöperative movement in Europe and in California shows that this fundamental basis is sound. In the latter state, one organization, the California Fruit Growers Exchange, which was formed as a stock corporation, but which operates strictly on coöperative principles, handles a business of twenty million dollars, more or less, annually on the "one man, one vote" principle of voting. The directors each represent a business that varies widely in volume and in value, but the "one man, one vote" principle of representation has stood the test of business experience and has been one of the foundation stones on which the success of this organization has been built. The directors reserved the right when they organized to vote pro rata on the shipments rep-

resented by them, but this method of voting has never been used in twenty years of business experience. The California statute governing the non-profit corporations without capital stock permits the voting power of members to be equal or unequal. In many of these organizations the voting power and property rights of the members is proportional to the contribution which each makes to the investment necessary for operation, the by-laws in some citrus fruit organizations providing that "members will contribute to the investment necessary for operation in true proportion to the number of bearing acres of citrus orchard owned or controlled by each member respectively bears to the whole number of bearing acres for which citrus fruits are delivered or engaged to be delivered to the association any time during the year such memberships are issued." Even with such a provision in the by-laws, the "one man, one vote" principle is generally used in voting on the business operations of the organization.

There is a strong sentiment against the "one man, one vote" principle of voting when first presented to the average producer. The large producer fears control by smaller interests; the small land holders, domination by their larger neighbors. The history of the coöperative movement, both in Europe and in the United States shows clearly that this adverse sentiment is a prejudice rather than an actual weakness in practical operation. Equality of membership strengthens the desire to coöperate, and men work together in business harmony just as they now do in the equal control of churches, schools and in governmental responsibilities.

(To be concluded.)

---

### FRENCH FORESTS IN THE WAR ZONE.

By SAMUEL T. DANA.

(Reprinted from *American Forestry*.)

When the history of the present European war comes to be written, it will probably be found that the forests of the regions involved have played a much more important part than is suspected by the ordinary reader. A hint of this is contained in a German news despatch of October 14, which read: "Heavy fighting continues in the Argonnes. Our troops are moving through dense underwood in very difficult ground with siege trains for use against the fortifications. The French troops offer obstinate resistance, firing from trees where machine guns are posted."

It is stated that this same forest of Argonne, which has been the scene of such vigorous and continued fighting during the present war, enabled the French to repulse the Prussian attack

of 1792 and, nearly eighty years later, in 1870, at the time of the Franco-Prussian war, concealed the maneuvers of the Germans before their crushing defeat of the French in the battle of Sedan. To the westward the forest of Orleans is said to have given the French the opportunity of rallying for their final stand in 1871; while to the eastward the forest of Soignes, by the shelter which it offered to Wellington's forces, contributed to the defeat of Napoleon at Waterloo.

That the French government itself recognizes the forests as a means of defense is shown by a provision in the Code Forestier, adopted in 1829 and still the forest law of the land, that private owners can be prevented by the government from clearing away forests at the frontier wherever these are deemed necessary for defensive purposes. There can be no question that they are in fact a decided advantage to the army having possession of them. First of all they offer a serious obstacle to the advance of the enemy. Troops cannot march nor can artillery trains be transported rapidly through dense woods, particularly when it is possible to block the few roads leading through them by fallen trees. In Alsace, so I was informed by an eye-witness, the first step taken by the Germans after the declaration of war was to barricade every road as effectively as possible in this way. Presumably the French did the same thing in their own country wherever they were forced to retreat. That the blockades established in this way were effective in checking the advance and wasting the strength of the enemy can hardly be questioned.

Furthermore, the forest forms an excellent shelter from which an army can fire upon an advancing enemy, while itself remaining in comparative security. It is easy to imagine an infantry or a cavalry charge across an open plain against an opposing army entrenched on the edge of a forest being repulsed with tremendous loss. On the other hand, there would be situations, particularly in level country, where the forest would present a serious obstacle to artillery fire, and considerable areas have probably already been cut over, in this as in other wars, to afford a clearer field and wider range for the batteries.

The value of a wooded cover in making fortifications must also not be overlooked. A correspondent with the German army in describing the fortifications about Metz has stated that they were so skilfully concealed by woods and blended with the hill-sides that nothing out of the ordinary was apparent. This is in striking contrast to the forts at Liège, which, being unprotected in this way, stood out so boldly against the sky line as fairly to invite bombardment. The correspondent further stated that in one particular battery which he visited overlooking the River Meuse, the guns were placed behind a screen of thickly-branching trees with the muzzles pointing to round openings in this leafy roof. Even the gun carriages and tents were screened with branches, while a hedge of boughs was constructed around the

entire position as a protection against spies. This battery had been firing for four days from the same position without being discovered, although French aviators had located all of its sister batteries so accurately that they had suffered considerable loss from shrapnel fire.

The present war is, of course, the first in which the forests have exercised this important function of concealing the positions and numbers of the various armies from the vigilance of the enemy's airmen. In open country nothing is more simple than for an aviator to determine with considerable accuracy the strength, position, and movements of the enemy's forces. In a forest this is impossible, and to the concealment which it affords can probably be attributed mainly what few surprises the strategists of the contending countries have been able to bring about in spite of aviators and spies. To the latter the forest offers an excellent opportunity for effective scouting. Natives of the country, thoroughly familiar with local conditions, find it comparatively easy to steal by outposts and to observe the enemy without being detected.

In the war zone of Northeastern France conditions as regard forest cover vary widely. In the roughly rectangular area to the northeast of the Seine and northwest of the Oise, the country is for the most part very flat, and is almost wholly given up to agriculture. To the south of the Oise and the Aisne, it becomes more undulating, with low hills, and here the farming land is interspersed with patches of forest and woodland. Still farther to the south and east along the Meuse river and in the Vosges mountains, the country becomes still more rugged and the forests more abundant.

The topography and the distribution of the forests throughout this region probably account largely for the decision of the Germans to hurl their main attack against France through Belgium rather than through the more difficult route to the south. To these factors can also be attributed in large measure the rapid advance of the right wing of the German army in the early stages of the war, while the left made little or no progress. In the north the comparatively level, unwooded country interposed practically no obstacle to the free movement of the armies, and as a result the early advance of the Germans here was almost incredibly swift. During the same period, farther to the south in the region of Verdun and Nancy, the rugged, heavily wooded country, in conjunction with fortifications and strongly entrenched troops, held both armies practically stationary.

To what extent the forests in the war zone will be injured during the progress of the war is problematical. That they will suffer more or less, however, cannot be doubted. Much wood will be cut for fuel and construction work; trees will be felled to block roads; whole stands may be leveled to clear the way for artillery fire; and the rain of shot and shell will do much damage



to standing trees, much more than the damage done similar forests in the Franco-Prussian war. Equally serious will be the havoc wrought by forest fires. These will be set not only by accident, but also purposely in order to harass the enemy. This was the case in the forest of Compiègne, which is said to have been fired by the British in order to drive out the Germans. While the fire may have been effective from this point of view, it also doubtless destroyed very largely the natural beauty of the famous forest and seriously disarranged the carefully laid plans for its management. If the war lasts as long as experts predict, it is certain that large sections of the forests in which the armies will operate will be cut down for firewood. To date it is evident that there has been much cutting of young growth to use as screens in hiding entrenchments and masking batteries. Cathedrals and other edifices are not the only objects that have been devastated. Like the cities and towns, the forests will for many years bear unmistakable evidence of the ravages of war, and in many cases the damage done them will take much longer to repair.

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### *MANURING FRUIT TREES.*

---

For maintaining fruit trees in bearing, in health and vigor, and enabling them to bear heavy crops of fruit, it is essential that they be properly nourished.

In practice, this is generally ensured by application of fertilizers.

In order to better understand the subject, it is worth the fruit-grower's while to unearth this knowledge himself, in his own orchard.

There are three ingredients which need to be furnished through the medium of fertilizers—namely, potash, phosphoric acid, and nitrogen. The remaining essential plant food constituents are usually present in the soil in abundant quantity, and need not be supplied. Adverting to these three important constituents, it is generally safer, when the fruit-grower is not properly conversant with the tree's requirements on his particular land, to apply all three. A one-sided manuring is not a profitable manuring, and is not productive of the best results.

In order to ascertain the requirements of fruit trees in his orchard, the fruit-grower is recommended to experiment; in other words, manure certain rows of trees in the orchard with different manurial dressings and closely observe the results with regard to yield, size, color, appearance, flavor, and keeping qualities of the fruit produced, and also the appearance, vigor and disease-resistant properties of the trees, and, not the least important, the profits accruing from their application.

The beginner should remember that potassic fertilizers supply potash phosphatic fertilizers, phosphoric acid; and nitrogenous fertilizers, nitrogen respectively.

Examples of potash fertilizers are: Sulphate of potash and muriate of potash. Those of phosphatic fertilizers: Superphosphate, basic slag, and bonedust, the last named also supplying a little nitrogen, while sulphate of ammonia and nitrate of soda may be cited as examples of nitrogenous fertilizers.

Supposing a fruit-grower is desirous of ascertaining whether fruit trees on his land will respond to potash, all he need do is to apply phosphatic and nitrogenous fertilizer to a number of trees and make a note of it. Such a dressing is known as an incomplete fertilizer, as it does not supply all the three important plant food ingredients. To an equal number of trees of the same age, variety and size, on similar land, he should apply the same amounts of phosphatic and nitrogenous fertilizer, plus, say, 1 to 2 lb. sulphate of potash per tree.

Similarly, if a grower desires to find out if it will be profitable to apply phosphatic or nitrogenous fertilizer, he may proceed on similar lines, omitting the particular fertilizer which he needs the information about from the dressing, in one case, be it phosphatic or nitrogenous, and including it in another. In this way the fruit-grower may observe the behavior of the trees towards the particular kinds of fertilizers.

Fruit crops are unlike most farm crops, in that the effects of fertilizers are not so readily observable, and the beginner needs to be warned against expecting outstanding results the first season. The second and subsequent seasons, however, good results may follow rational manuring.

Mr. Alfred Thiessen of Geeveston, Tasmania, laid down experiments on the three-plot system in the spring of 1912 with apple trees. The trees on the No. 1 plot were left unmanured, those on No. 2 received 3 lb. superphosphate, 2 lb. bonedust,  $\frac{1}{2}$  lb. sulphate of ammonia,  $1\frac{1}{2}$  lb. sulphate of potash per tree, and those on No. 3 received 3 lb. superphosphate, 2 lb. bonedust,  $\frac{1}{2}$  lb. sulphate of ammonia.

The yields, calculated per acre, for the first season were: Plot 1, 560 cases; Plot 2, 800 cases; Plot 3, 666  $\frac{2}{3}$  cases.

The past season's results (being the second year of experiment) were: Plot 1, 524  $\frac{1}{2}$  cases; Plot 2, 1022  $\frac{1}{4}$  cases; Plot 3, 915 cases.

The absence of fertilizer on Plot 1 accounted for considerably lower yields. The trees on Plots 2 and 3 each received the same amounts of superphosphate, bonedust and sulphate of ammonia. Those on Plot 2 were given  $1\frac{1}{2}$  lb. sulphate of potash in addition.

The difference in yield, and consequently the money value, between the two plots was well marked, and showed that the complete fertilizer was the most profitable one.—*The Fruit World*.

## PRUNING OF ORANGE TREES.

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On no account plant below the level of surrounding surface, or so that the original ground level of tree will sink below that plane. It is very much preferable to err on the other side; the roots will extend downwards where necessary, but the base of stem is a fixture and will remain where placed unless forcibly moved. Nursery stock is not infrequently trained to a long bare stem terminating in a bunch of small branches. Such samples should be cut back to within 18 inches or less of the ground level—in fact, all trees other than those reared in pots should be well shortened at planting, four or five shoots which are to form the main branches being allowed to start at regular intervals. A little extra attention in the early stage and the first two years' growth will, by the removal of surplus and misplaced shoots, not only remove the necessity of later amputation of larger branches, but by directing the growth into permanent channels assist in the earlier development of the tree. No hard-and-fast rules can be followed for pruning young trees, but misplaced shoots should be removed in the earliest stages by a sharp knife and cut close to the base, thus removing any adventitious buds which the practice of rubbing off with finger and thumb allows to remain, to become a perpetual source of trouble and the formation of unsightly callus. The orange being exceedingly susceptible to injury by exposure of its roots, for this reason the handling of young trees must be such as to allow a minimum of exposure. They should not be allowed to become dry under any condition, and the application of water at planting should be as soon after insertion as possible.—*Queensland Agricultural Journal*.

## FRUITING CAPACITY OF THE PAPAYA.

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The question of the advantage derived from thinning out the ring of fruits on the papaya tree is discussed in an Indian article reproduced in the *Tropical Agriculturist* for January, 1915. An experiment was conducted at Poona with the fruit of twenty plants, ten of which were thinned and ten unthinned. The number of fruits obtained from the thinned was ten, whilst the unthinned gave twenty-four. Although the increase in weight of the individual fruit in the case of the thinned plants was very considerable, and although there was an accompanying rise in the price, the results showed that the increase of weight and value was not sufficient to compensate for the loss of fruits. This conclusion refers only to the particular experiment just described. The article goes on to say that with a small number of, say six, good fruits per plant the experiment may pay ultimately when carried out on a large scale as indicated in the Annual Report of the Government Horticultural Gardens, Lucknow, for 1912, where it is stated that an acre of land carrying 1000 plants, each

producing six to ten fruits after thinning, may give considerable profit to the grower. The difficulty is to hit on exactly the right amount of thinning to get the greatest weight compatible with the greatest number of fruits. This can only be obtained by practice, and in the meantime it is recommended to remove only such fruits as are obviously going to be badly crushed.—*Agricultural News*.

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### THE FARMER'S CREED.

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I believe that the country which God made is more beautiful than the city which man made; that life out of doors and in touch with the earth is the natural life of man. I believe that work with nature is more inspiring than work with the most intricate machinery. I believe that the dignity of labor depends, not on what you do, but how you do it; that opportunity comes to a boy on the farm as often as to a boy in the city; that life is larger and freer and happier on the farm than in the town; that my success depends, not upon my dreams, but upon what I actually do; not upon luck, but upon pluck. I believe in working when you work, and in playing when you play, and in giving and demanding a square deal in every act of life. — Edwin Osgood Grover, in *Philippine Agriculturist and Forester*.

---

### A PRAYER THAT NEVER GETS OLD.

---

Oh for a lodge in some vast wilderness,  
Some boundless contiguity of shade,  
Where rumor of oppression and deceit,  
Of unsuccessful or successful war  
Might never reach me more. My ear is pained,  
My soul is sick with every day's report  
Of wrong and outrage with which earth is filled.

WILLIAM COWPER.

---

In hot weather it is no indication that the fowls have had enough if they leave their food.

Neglecting to give fowls a regular supply of water is a serious matter. Dark combs are often an indication of neglect in this respect.

Sudden changes in the system of feeding are often responsible for vexation and loss. Any contemplated change should be made by degrees.

It is impossible to raise vigorous stock if these are not kept in the pink of condition. Protection from climatic extremes, absolute cleanliness, and a good supply of green feed are essentials to this end.—*Feathered Life*.

## UTILIZATION OF SUN POWER.

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An interesting paper was read at the International Congress of Tropical Agriculture on the utilization of sun power for irrigation and other purposes connected with agriculture in the tropics. The principle involved in these machines is the concentration of radiant energy by means of mirrors on to boilers enclosed in glass cases to check radiation.

Mr. F. Shuman stated that results of tests of the sun power plant near Cairo in Egypt had been satisfactory. It is estimated that power can be produced in the tropics at the same cost as if coal were less than 10s. per ton; and as coal in many parts of the tropics costs £2 10s. per ton, upwards, the saving to be effected by means of sun power plants is quite obvious. Though sun power plants cost more than coal-burning plants, the saving effected by not requiring any fuel is sufficient to wipe out the extra capital cost after two years, and in four years to pay entirely for the whole equipment.

Discontinuity in sunlight is overcome by the art of using low pressure steam: boiling water is stored in tanks and the steam drawn upon as required.—*Agricultural News*.

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## DROPPING OF BREADFRUIT.

We often have callers and letters asking why the young fruit drops from certain breadfruit (or other fruit) trees, so that none mature. This is usually because there is too much vegetative vigor in the trees—they run to leaf and twig, and this condition is usually caused by a too plentiful supply of water at the wrong time.

As a rule such trees are standing in yards where there is a water pipe, and the water is constantly soaking the roots, inducing fresh growth. When once the breadfruit tree blossoms freely, the water should only be allowed moderately when the soil is seen getting dry; and the fruit will thus hold.

Where the conditions of growth are not governed by a water pipe, and the fruit will not hold, the owner should try, as an experiment, girdling the tree with a wire drawn tight round the trunk, doing this just when the fruit is setting. It will generally be found that this will prevent the falling of the fruit. When the fruit is over half fit the wire can be taken off and the bark will heal over in three months.

This can be done with all fruit trees that drop their fruit just after setting, or when trees make plenty of leaf growth but do not fruit at all. Of course, dropping of fruit is not to be confounded with young fruits dropping because of the trees bearing

too large a crop; in this case there are always plenty left to mature. Our remarks apply when no fruit, or only a very few, remain on the tree, all the others dropping off before maturity.—*Jamaica Agricultural Society Journal.*

---

Charcoal is cheap enough, and is an excellent thing for poultry.

Irregular feeding is often the cause of many disorders in poultry.

The absence of green food means an undesirable pale color in the yolks of the eggs.

Laying hens should have all they can eat, and this should be of a high grade character.

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Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

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The Division of Hydrography has on hand free publications relative to the water resources of the Hawaiian Islands. These publications furnish detailed data as to daily, monthly, mean, maximum, and minimum run-off of streams and ditches, and also cuts and maps pertaining to the different islands. These publications will be mailed free of charge on request.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

G. K. LARRISON,  
Superintendent of Hydrography.

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The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

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To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the also specimens of the injury. In a tin with a hole or two, or a wax box specimens may be mailed by parcels post. When specimen not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications to  
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EDW. M. EHRHORN  
Superintendent of Entomology

# THE HAWAIIAN FORESTER AGRICULTURIST

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JULY, 1915.

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Reports of the various divisions of the Board of Agriculture and Forestry for two months will be found in this number. They show in general effective work and progress by the chiefs and their assistants.

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In its issue of June 5 the Agricultural News (West Indies) devotes a page to a review of the reports of the Hawaii Experiment Station for 1913 and 1914, to which it calls attention in its editorial notes, where also a recent article in the Forester, on pearl oyster culture, commenting upon one in the News itself, is mentioned.

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It is clearly proved in the Journal of the Board of Agriculture for April, 1915, says the Agricultural News, that tubercular fowls may be a serious source of infection as regards pigs. On examining the organs of a total of 118 tubercular pigs, it appeared that eighty-six of them contained bacteria identical in every detail with tubercular bacteria, twenty-eight contained bovine bacteria, and in the remaining four cases the bacteria deviated in form from both types, but in two cases closely resembled the avian type. On the whole, the results of the investigation show that the overwhelming majority of the cases of mesenteric tuberculosis are of a local character, and almost exclusively due to avian tubercular bacteria.

---

Hawaiians on their travels this summer might do worse than take in Oklahoma state fair and exposition, at Oklahoma City from September 25 to October 2. Printed matter concerning it has been received, which indicates that this, one of the newest stars in the Union constellation, will shine brilliantly on the occasion.

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The department of agriculture has issued a bulletin upon "Zygadenus or Death Camas," a plant which is found throughout the United States. In appearance it is grass-like, growing from a rootstock or bulb which looks like an onion; while the flowers are greenish white or yellow and somewhat resemble nignonette. In the Northwest the plant is known by numerous common names, such as lobelia, soap plant, alkali grass, water

lily, wild onion, hog's potato, squirrel food, poison sago, etc. No satisfactory or practical remedy for its effects upon stock has been found, although it is stated that animals becoming sick from eating it should be kept quiet, and that under this treatment many will recover.

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## DIVISION OF ANIMAL INDUSTRY.

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### REPORT FOR APRIL.

Honolulu, April 30, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to submit herewith my report for the month of April, 1915:

#### BOVINE TUBERCULOSIS CONTROL WORK.

As will be seen from the appended report of Dr. Case's, the eradication of bovine tuberculosis which was begun five years ago this month, is rapidly approaching the desired goal. The question raised before the Agricultural Committee of the recent Legislative Assembly, as to whether it would be possible to completely eradicate bovine tuberculosis from this Territory, and whether, when once eradicated, it would be possible to prevent its reappearance seem to be definitely answered by the results before us here, as well as by the facts observed elsewhere, notably on the Island of Jersey, where bovine tuberculosis has never gained entrance. While it has required five years to reduce the number of dairy cattle affected with tuberculosis on the Island of Oahu from more than thirty per cent to less than two and one-tenth per cent, we feel justified in claiming that the remaining small number of affected animals can be located and disposed of, and the last trace of infection eradicated if the systematic work of testing is continued for another year. The work will be facilitated much if local sanitary authorities are willing to enforce their own statutes and adhere to the requirements of the ordinance which makes the issuing of a milk permit dependent upon the applicant's dairy herd having been tested and found free from bovine tuberculosis.

To abandon the work now would mean a speedy return to the conditions of five years ago, the time required to reach this condition depending entirely upon the measures taken by each individual dairy owner to protect his clean herd against the infection from his neighbor's diseased herd, unless it is decided by this Board to proceed against bovine tuberculosis as it has done against glanders among horses and mules, that is, deal with it

as an infectious and contagious disease transmissible to human beings and as such dangerous to public health. That this has not been done before was due to the great prevalence of the disease and the lack of funds wherewith to indemnify the owners of diseased cattle. It was therefore left to the dairymen gradually to clean their herds of infected animals and obtain remuneration for them through an increase in the price of milk. In this manner nearly ninety per cent of the milk producers on Oahu have gradually cleaned their herds, and there remains but a limited number who still harbor the infection and who seem to find it profitable to do so. When therefore a bill providing for the indemnification of the milk producers still having infected animals in their possession, was introduced before the last legislature it was actually defeated by these same dairymen for whose benefit it was promulgated.

Under these circumstances it would not seem necessary for this Board to be deterred any longer, as regards the complete eradication of the disease, at least if the statement on the basis of which the indemnification bill was defeated is proven correct, i.e., that ninety per cent of the local milk producers did not want any indemnification. It must also be borne in mind that the dairymen who have sacrificed varying numbers of their cattle in order to clean their herds and comply with the local regulations are entitled to protection against reinfection, or at least those who desire to continue to keep their herds clean, and if such protection should be required of this Board and the owner of a neighboring infected or untested herd should refuse to have his animals tested and the reactor destroyed it is well within the powers of this Board to place a rigid quarantine on the infected premises, which would mean the complete segregation of all the animals as well as their products, whether milk or manure.

Before resorting to such drastic measures, however, it is to be hoped that the recent opposition to this Board's tuberculosis control work will take the trouble to familiarize themselves with the various statutes and regulations now in force and pertaining to this subject, and will realize that the milk-consuming public will never agree to a return to milk from tuberculous cows for their children, regardless of the form in which it may be served. While pasteurized milk is safe enough, if properly pasteurized under official supervision, the best authorities agree that it is never safe to rely on pasteurization, and where there is so little infection left as is the case here, the only sane and safe way of dealing with it is by eradication.

#### THE HOG RAISING INDUSTRY.

While there is a certain mortality among the young pigs and especially among those only a few days old the same may be said

to be due principally to poor sanitary and hygienic conditions. In this connection it might be well to note what are the conditions along these lines in other places and what can be done to reduce this great mortality, the principal cause of which undoubtedly is to be found in faulty feeding, a lack of variety in the food offered, the use of too much swill and in some cases the almost complete absence of good pasturage and green feed of various kinds. The care of the sow at the time of farrowing also is of immense importance in saving a large percentage of the pigs born, and a lack of experience in dealing with both the mother and the young ones at this critical time is said to be enough to reduce the size of the litters by fifty per cent. The following is quoted from the *Country Gentleman* of May 15 of this year:

"We expect to lose some pigs, and if a sow crushes five or six in a night we call it hard luck. If she kills the whole litter we tag her for the butcher, and such is life on the hog farm. We do not realize that one-sixth of our pigs are gone. The truth is, we kill the young pigs by improper feeding of the sows or allow them to die as a result of our own carelessness.

"The precautions to be observed are simple: Handle your sows and accustom them to handling, but do not worry them at farrowing time. Be on hand when the litter arrives, and as each pig is born put it into a box that has been well bedded with straw so as to be warm and comfortable. When the sow settles down and is resting easily let the pigs nurse. Later if she becomes restless return them to the box. Be careful that you do not allow her to crush half the litter while you are at dinner or are doing chores at some other part of the farm.

"The first four or five days are the most critical for the young pigs, and a little time with them at that period pays big dividends later. Most breeders allow the sow only water for the twenty-four to forty-eight hours after farrowing. A few give one good feed to fill the sow up and keep her quiet. We prefer the first plan. Increase the amount of feed gradually and avoid any sudden changes in kind of feed supplied. Have the sleeping beds dry and fresh, keep the troughs clean, and see that all the pigs get plenty of exercise and sunlight.

"Two years ago an Iowa short-course instructor reported the following losses of young animals in that state:

"362 Iowa farmers lost 22.3 per cent of all colts foaled.

"469 Iowa farmers lost 8.4 per cent of all calves dropped.

"442 Iowa farmers lost 23.7 per cent of all pigs farrowed.

"Such loss and waste is too great a tax on the livestock industry. Buildings and equipment may be partly responsible, but improper feeding, carelessness and ignorance kill a large share of the young animals."



## RABIES IN DOGS.

Another quotation relative to this Board's efforts at preventing the introduction of rabies or hydrophobia into the Territory with dogs coming from the mainland of the United States and from countries where this disease is known to exist would seem to be of sufficient interest to repeat here. It is taken from the May, 1915, issue of the Veterinary Record, London, England, and reads as follows:

"Most of us can remember the outcry that dog owners raised against the Board of Agriculture policy of quarantining imported dogs. The wisdom of that policy has been evident for a long time, and has recently been strikingly exemplified. We have just had the first case of canine rabies in the Kingdom since 1902; and it occurred in a dog in quarantine, and therefore unable to affect others. There is no gainsaying the moral of these two facts—the long immunity, and the one case occurring in the security of quarantine. Our present quarantine secures us from rabies. But if we relax it, the importation of dogs will greatly increase, and the prevalence of rabies in many other parts of the world would soon cause its re-introduction here."

Respectfully submitted,

VICTOR A. NORGAAED,  
Territorial Veterinarian.

## REPORT FOR MAY.

Honolulu, May 31, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to report on the work of the Division of Animal Industry for the month ending May 31st as follows:

## HOG CHOLERA.

On Saturday, May the 8th, this office was notified that a disease supposed to be hog cholera had appeared among the swine on the ranch belonging to Mr. Charles Bellina at Kuliouou, about eight miles from Honolulu on the road to Koko Head. The place was visited immediately and the diagnosis confirmed by post-mortem examination of a number of dead hogs. Vaccination with anti-hog cholera serum had already been begun, but as the disease appeared to be of a most unusually virulent nature and as the location was favorable for the purpose, it was recommended that the treatment of the hogs be placed in the hands of this Board, the

owner agreeing to abide by all instructions as to care, treatment and segregation, the Board furnishing the vaccine required.

On Monday, May 11th, while visiting the same place and while making a post-mortem examination of a recently dead hog, the writer was informed by Mr. P. Pond's ranch superintendent that a number of hogs had died at Mr. Pond's hog farm near Leilehua, showing the same symptoms, that is, ulcers in the intestines, as those exhibited in the hog then being examined. Consequently a visit was made to Mr. Pond's farm the following day, where it was learned that acute, virulent hog cholera had prevailed for ten or eleven days, making its first appearance on May 1st, or the day following my last visit to that place. No satisfactory reason for not notifying this office of the existing conditions could be obtained as little as Mr. Bellina could give any reason for his failure to report the outbreak on his place. It must therefore be considered a most remarkable coincidence that so virulent and fatal a disease should make its appearance simultaneously on two hog farms, forty miles apart, with no similar disease existing in the Territory and no hogs having been introduced from the mainland since March 15th, or nearly seven weeks before.

As already stated the serum treatment was undertaken immediately and with very good success in both of the infected herds. While a number of hogs were lost before the disease was under control the total loss aggregates but a fraction of what it would have been except for the serum treatment, and this fraction would undoubtedly have been still smaller had a sufficient quantity of serum been on hand to treat all the animals at once. The serum however is expensive, while its curative value diminishes with time; nor is it returnable to the manufacturers. For these reasons the local druggists cannot afford to keep it on hand in large quantities, but must rely on the cable for supplies beyond a reasonable amount, unless guaranteed by the hog owners.

The curative as well as preventive properties of this treatment are, however, well illustrated by the fact that at the present writing, that is seven to eight weeks after the first outbreak of the disease, all of the hogs which were injected before the disease had advanced beyond the fatal point and many of which were very sick at the time of treatment are now doing well and gaining flesh rapidly; still more remarkable, however, is the fact that the disease did not gain access to any other piggeries or hog farms, but was kept confined to the two original farms, which of course were declared in quarantine immediately after the diagnosis was made. But as both owners failed to report the appearance of the disease promptly there was every opportunity for the infection to become widespread before a quarantine was established, and what with dogs, horses, swill wagons, trucks and the shoes of laborers, drivers and visitors, it is as stated very remark-

able that the belated quarantine measures proved so effective. The continued drought with much sunshine and many warm days has undoubtedly assisted materially in destroying such infection as may have been carried away through carelessness or ignorance, while the treatment itself, aimed as it is at the destruction of the infection while still in the system of the affected animals, may also be responsible for part of the success. The outbreak may therefore be considered as having come to a close while its origin remains a complete mystery which may never be cleared up. The unusual virulent form of the outbreak will however necessitate the continuation of the quarantine for four to six weeks after the last death from cholera in either of the two places in question.

#### BOVINE TUBERCULOSIS CONTROL WORK.

As stated in last month's report bovine tuberculosis is so nearly eradicated that only very few herds now remain where the disease may be said still to be well established. One of these herds, belonging to one of the largest dairy men on Oahu, is shortly to be moved from its present location to a new modern dairy now under construction and located in a neighborhood where a great deal of milk is being produced and where all the dairy men have endeavored to free their herds of diseased cattle and with uniform success. Two of these dairy owners both of whom now possess clean herds strenuously object to having a diseased herd moved into their immediate neighborhood, and have strongly voiced their protests to this office. As bovine tuberculosis is now recognized and guarded against as a dangerous, infectious and contagious disease, transmissible to human beings, through federal, territorial and municipal statutes, laws, regulations and ordinances, it would seem that the protests in question, though without precedent, are well founded and demand the support of this Board. The statute creating the Division of Animal Industry gives the Board full power to quarantine any premises on which are kept live stock affected with infectious or contagious diseases. Federal regulations prohibit the shipment in interstate trade of animals so affected, while territorial laws and regulations prohibit their introduction into the Territory. Finally, a municipal ordinance forbids the sale of milk from animals so affected.

If therefore the owner in question should decide not to have his herd tested and freed of tuberculous animals before moving it the Board would of necessity be constrained to declare his herd and premises quarantined which measure would likewise prevent the removal of any milk from the premises. I have however recently called on the owner and urged him to comply with the requirements of the local sanitary authorities, and I have hopes that he will see the necessity of doing so. There is every reason to believe that the milk consuming public will not wittingly and

knowingly return to tuberculous milk as a steady diet for their children, and the owner might find it difficult to dispose of his milk should the conditions on his premises become known generally.

In this connection I am pleased to state that there is a prospect of the renewal of the municipal milk inspection in coöperation with this Board, Mr. Logan informing me that he intended to take the matter up with the members of the Board.

Respectfully submitted,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

#### REPORTS OF ASSISTANT VETERINARIAN.

Honolulu, April 30, 1915.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit the following report for the month of April, 1915:

#### *Tuberculosis Control.*

The following dairy cattle have received the tuberculin test during the past month:

	T.	P.	C.
Charles Lucas .....	102	102	0
E. W. Williamson.....	6	6	0

A total of 108 head have been tested all of which have been passed as free from tuberculosis.

At the end of 1914 the records showed 2.08% of tuberculosis for the entire Island of Oahu, this being a reduction from 31.25% in four years work and 2.82% of tuberculosis in the city herds proper, a reduction from 24% as found four years ago. At the present time 76.08% of the dairies of the City and County of Honolulu are free from tuberculosis and can be kept free from now on if the dairy owner is willing to exercise all possible precautions.

The test this year, which is the sixth annual test since the commencement of systematic eradication of bovine tuberculosis on the Island of Oahu, gives the following results to date:

No. of Herds.	Total No. of Animals.	Number Passed.	Number Condemned.
12	1,638	1,572	66

Out of the above herds, two were found heavily infected. One was tested for the first time this year and the other, although test-

ed a number of times previously, more than three times the number of animals were tested this year than at the last test. These two herds totalled 672 head with a total of 45 condemned animals.

In the city herds proper, with a total of 866 animals there have been condemned 21 head, giving a percentage of 2.4% of tuberculosis, which is almost one-half of one per cent less than that found in the city dairy herds in 1914. The above 2.4% includes a retest of one of the largest dairy herds where, up to the present test, there has always been a number of reactors.

As illustrative of the value of this work and the progress which is being made, it can be stated that when this campaign of eradication started in 1910, five years ago this month, the largest dairy herd in the Territory contained 75% of tuberculous animals, while today it contains but 1.2%, and it is safe to say that in a few more tests tuberculosis will be wiped out of this herd completely.

The above is only one of a number of cases which could be cited to show what has been accomplished since this work began and how close we are to the goal of total eradication. Should this work now be discontinued or be performed in a lax or half-way manner only a few years would have to pass before tuberculosis would again be prevalent throughout the island.

#### IMPORTATION OF LIVE STOCK.

Sierra, San Francisco: 11 crates poultry.

Lurline, San Francisco: 6 crates poultry; 6 cows (Durham), K. S. Co., care of C. Brewer & Co. One cow arrived suffering from a bilateral dislocation of the femero-sacral joints and had to be killed; 52 mules, Schuman Carriage Co.

Wilhelmina, San Francisco: 16 crates poultry; 2 cans gold fish, W. F. A. Co.

Arizonan, Seattle: 21 horses, 21 mules, 100 hogs for breeding, 181 hogs for slaughter, 2 Holstein cows; A. L. Macpherson.

Manoa, San Francisco: 11 crates poultry.

Korea, San Francisco: 1 dog, Mrs. H. Isenberg.

Matsonia, San Francisco: 21 crates poultry.

Manchuria, Orient: 4 Chinese geese, Mr. Lantang.

J. A. Chanslor, San Francisco: 1 dog, Sgt. Griggsbee.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

Honolulu, May 31, 1915.

Dr. A. V. Norgaard, Chief of Division of Animal Industry.

Dear Sir:—I have the honor to submit the following report for the month of May, 1915:

*Tuberculosis Control.*

The following dairy herds were tested during May:

	T.	P.	C.
Waialae Ranch .....	301	295	5
Waialae Ranch .....	106	106	0
Dr. C. B. Cooper.....	5	5	0
Mokuleia Ranch .....	434	432	2
J. McTaggart .....	2	2	0
K. Yamashita .....	1	1	0

From the above tabulated list it will be seen that a total of 849 animals were tested, 841 being passed as free from disease and 7 condemned. These condemned animals have already been slaughtered, five at the new slaughter house at Wahiawa and five at the Waialae slaughter house.

## HOG CHOLERA.

In connection with the recent outbreak of hog cholera, nine trips of inspection have been made to Charles Bellina's ranch at Kuliouou and three trips to P. M. Pond's pig farm beyond Leilehua. Both ranches were placed under quarantine and strict orders given to the effect that no persons or wagons be allowed on the premises except those directly connected with the care and feeding of the pigs; that no hogs be taken from the premises either for slaughter or for any other purpose except by express permission of this office whereby safe means of transportation could be guaranteed.

Notwithstanding our strict orders, on the 13th and 14th of May shipments totalling 24 hogs were sent from one of the above ranches to a Honolulu slaughter house, motor trucks being used as a means of transportation. This was in direct violation of quarantine and without any permit from this office. Only yesterday I found that a Japanese pig raiser from Mokuleia, who has been cutting green feed in exchange for swill, has been allowed to drive right on to the place and discharge his load of green stuff and wait a varying length of time for the arrival of the swill wagons. The chances are very good that during these waits this man walks over a large part of the farm. Under these

conditions it is a very easy matter for him to track the disease to his own place and so keep it spreading. No longer ago than last week the manager gave every assurance that this man never came further than the entrance from the main road.

At these periodical inspections every possible advice and help has been given regarding hygiene and sanitation, methods of treatment and dosage in vaccination, but something must now be done to enforce our quarantine regulations.

#### IMPORTATIONS OF LIVE STOCK.

Sierra, San Francisco: 9 crates poultry.

Lurline, San Francisco: 1 horse, D. Ferreira; 53 mules, Schuman Carriage Co. Kahului: 1 percheron stallion, 1 steel grey stallion, F. F. Baldwin; 1 crate poultry, Maui Agricultural Co.

Wilhelmina, San Francisco: 19 crates poultry.

Manoa, San Francisco: 13 crates poultry. Kahului: 3 crates poultry.

U. S. S. Columbine, San Francisco: 1 dog, E. H. Bartels.

Manchuria, San Francisco: 1 dog, Dr. F. L. Sanborn.

Matsonia, San Francisco: 12 crates poultry; 1 Angora cat, E. A. Knudsen.

Niagara, Sydney: 1 crate poultry.

Sierra, San Francisco: 1 parrot, W. F. X. Company.

Shinyo Maru, Yokohama: 1 dog, Mrs. Johnson.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

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#### DIVISION OF ENTOMOLOGY.

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#### REPORT FOR APRIL.

Honolulu, April 30, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of April, 1915, as follows:

During the month 51 vessels arrived at the port of Honolulu of which 26 carried vegetable matter. Six vessels came by the Panama Canal route.

<i>Disposal.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	846	17,752
Fumigated .....	4	4
Burned .....	48	49
Returned .....	4	4
Total inspected.....	902	17,809

Of these shipments 17,568 packages arrived as freight, 145 packages through the postoffice and 96 packages as baggage of passengers and immigrants.

#### RICE AND BEAN SHIPMENTS.

During the month 43,419 bags of Japanese rice, 500 bags of Chinese rice and 3,018 bags of beans arrived from the Orient, and after thorough inspection were found free from rice and bean pests and the shipments were allowed to be delivered.

#### PESTS INTERCEPTED.

Thirty-nine lots of fruit and 4 lots of vegetables were taken from the baggage of passengers and immigrants from foreign countries and destroyed by burning. A package of hopvine roots from California was found infested with white ants (*Termites*) and was destroyed by burning. This package had been passed as free from pests by a local inspector at place of shipment. I wrote to the County Commissioner of Los Angeles County and drew his attention to the matter. A cherry tree from Japan was infested with Aphids (*Shermes species*) and also contained a colony of ants. After fumigation and removal of soil the plant was passed. Two lots of gladiolus bulbs by mail and express were found infested with the bulb aphid. Both shipments were thoroughly fumigated before delivery. A shipment of rose plants was treated to fumigation on account of aphid infestation. A passenger brought a five-leaved pine tree from Japan, but under the federal regulation we refused its landing, such plants being prohibited from being brought into the United States. One package of tree seed from Manila came by mail and was returned as unmailable under rulings of the Federal Horticultural Board. Two packages of fruit were sent back on board the Transport Thomas as coming from Manila; they are prohibited from entry. Among a few palmseeds from Cuba we found one containing a large weevil and from another we got about 100 parasites (*Chalcids*), which appear to be the parasite of this palmseed weevil.

#### BENEFICIAL INSECTS.

Mr. D. T. Fullaway's work is reported on in his report attached hereto. As will be seen large quantities of the various parasites



have been liberated in sections most favorable at this season of the year. There has been considerable complaint of damage done by the Japanese rose beetle, and quite a lot of inoculated beetles have been distributed. Outlying districts surrounded by waste lands have suffered more than others.

#### HILO INSPECTION.

Brother M. Newell reports the arrival of eleven steamers and one sailing vessel of which six steamers brought vegetable matter consisting of 315 lots and 4,616 packages. One crate of turnips was destroyed on account of infestation of the cabbage maggot.

Seventy-nine sacks of potatoes were destroyed on account of being badly infested by the potato tuber moth. The Anyo Maru arrived direct from Japan with 8,974 bags of rice, 543 bags of beans and one bag of sesame seed, all of which were found free from pests.

Owing to the constant increase of steamers and vessels and the changing of crew I deemed it advisable to have our regulations printed in condensed form for posting on vessels coming into the port. Every vessel now arriving whether it remains here or is only passing through is furnished with several notices with a request to post them in conspicuous places on board the vessel.

#### INTER-ISLAND INSPECTION.

During the month of April 58 steamers plying between Honolulu and the ports of the other Islands were attended to. The following shipments were passed:

Plants . . . . .	66	packages.
Taro . . . . .	644	bags.
Vegetables . . . . .	60	packages.
Fruit . . . . .	4	"

Total inspected.....774

The following packages were refused shipment on account of infestation or of having soil attached to the plants:

Plants . . . . .	8	packages.
Fruit . . . . .	14	"
Total refused.....	22	"

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

## NOTICE.

Territory of Hawaii—Board of Commissioners of Agriculture and Forestry—Division of Entomology—Fruit and Plant Inspection.

*Importations Subject to Inspection.*

Nursery stock, tree, shrub, plant, flower, vine, cutting, graft, scion, bud, seed, root, fruit pit, fruit, vegetable leaf, nut or moss are inspected for insects and diseases liable to become injurious. Also queen bees and honey. Labels must be affixed to containers of the above shipments, giving name of shipper, locality of production, description of articles and name of consignees.

*Importations Absolutely Prohibited.*

Coffee trees or shrubs.

Cacao from Dutch E. Indies, Ceylon or India.

Fresh Fruit from E. or W. Indies, Asia, Australasia, Oceanica, Malaysia, Mexico, Central or South America.

Live Animals, including "Flying Fox" or "Fruit Eating Bat," "Land Crab," bird, reptile, or insect injurious or liable to become injurious.

Soil of any kind.

Rice infested with insects liable to become injurious.

Banana fruit, shoots or plants from Central America, Panama Canal Zone, West Indies, Dutch Guiana, Oceanica, Malaysia and the Orient.

All Sugar Cane from any part of the world.

Penalty for Violations.

Any person violating any of the provisions of this chapter; or any rule or regulations of the Board of Commissioners of Agriculture and Forestry, and any master of any vessel which shall bring into this Territory any article which the Board shall at any time prohibit from being imported into this Territory; and the master of any vessel from which shall be landed any article in this Act required to be inspected, until he shall have received a permit to land the said articles from the Board or its Officer or Inspector, as herein provided, shall be guilty of a misdemeanor, and shall be punished by a fine not to exceed \$500. (R. L. Haw., Ch. 28, Sec. 390, as amended by Act 112, Session Laws of 1907).

E. M. EHRHORN,

Chief Plant and Fruit Inspector.

By order of the Board of Commissioners of Agriculture and Forestry. Territory of Hawaii, U. S. A.

## REPORT FOR MAY.

Honolulu, May 31, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of May, 1915, as follows:

During the month 53 vessels arrived at the port of Honolulu of which 25 carried vegetable matter and one vessel moulding sand. Twelve vessels came by the Panama Canal route.

<i>Disposal.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	792	18,340
Fumigated . . . . .	2	2
Burned . . . . .	73	79
Returned . . . . .	2	4
	<hr/>	<hr/>
Total inspected.....	869	18,425

Of these shipments 18,047 packages arrived as freight, 192 packages through the postoffice and 186 packages as baggage of passengers and immigrants.

## RICE AND BEAN SHIPMENTS.

During the month 35,469 bags of Japanese rice, 50 bags of Chinese rice, 3,792 bags of beans, 272 bags of corn from Manchuria and 200 bags of buckwheat from Oriental ports arrived, and after thorough inspection were found free from rice, bean and grain pests and all shipments were allowed to be delivered.

## PESTS INTERCEPTED.

Twenty-five lots of fruit and 38 lots of vegetables were taken from the baggage of passengers and immigrants from foreign countries and destroyed by burning. In the soil around a cherry tree from Japan a few grubs of *Anomala* beetles were found, also a colony of ants. A small package of beans in the mail from Japan was infested with the common bean weevil *Bruchus chinensis*, and was fumigated before delivery. A shipment of Hydrangea plants from Pennsylvania was infested with Aphids and fumigated before delivery. Four packages of seeds and plants from foreign countries arriving by mail were returned to the sender under the ruling of the Federal Horticultural Board as unmailable. A large quantity of tobacco belonging to a firm here was stored in our large fumigating house on Kilauea street and subjected to fumigation on account of being infested with the tobacco beetle.

## BENEFICIAL INSECTS.

Mr. D. T. Fullaway's work during the month is reported on in his attached report. Large quantities of various parasites were reared and distributed on all the Islands. During the month further complaint was received regarding the damage caused by the *Japanese Rose Beetle*, and lots of inoculated beetles were furnished those who took the trouble to bring in beetles for inoculation. I have also had a circular printed giving instructions how to inoculate the beetles so that those living away from Honolulu can produce larger quantities of inoculated beetles for their own locality.

During the month I visited Hilo for the purpose of looking into the inspection work at that place. I found that the work has increased to some extent, and realize more than ever the necessity of having to provide other equipment in the very near future. I also visited the Kuhio Wharf for the purpose of finding out just when and where we can expect to put up the necessary equipment for handling the large shipments which will land at this wharf. It will be some time yet before any definite plans can be made owing to the unfinished condition of the wharf.

## HILO INSPECTION.

Brother H. Newell reports the arrival of ten steamers, five of which brought vegetable matter consisting of 169 lots and 1889 packages. Excepting for one package of turnips which were infested with the cabbage maggot and two lots of gladiolus bulbs which were infested with the bulb aphid all shipments were passed as free from pests. The turnips were destroyed and the gladiolus bulbs were fumigated before delivery.

## INTER-ISLAND INSPECTION.

During the month of May 67 steamers plying between Honolulu and the ports of the other islands were attended to. The following shipments were passed:

Plants . . . . .	79	packages.
Taro . . . . .	742	"
Vegetables . . . . .	93	"
Fruit . . . . .	6	"
<hr/>		
Total inspected . . . . .	920	"

The following packages were refused shipment on account of infestation or of having soil attached to the plants:

Plants . . . . .	12	packages.
Fruit . . . . .	9	"
	<hr/>	
Total refused. . . . .	21	"

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

#### REPORT OF INSECTARY:

Honolulu, April 30, 1915.

E. M. Ehrhorn, Esq., Superintendent of Entomology.

Dear Sir:—Permit me to report the following operations in the insectary during the month of April, 1915:

Bred 6,900 *Tetrastichus*, 1,129 female and 2,258 male *D. fullawayi*, 138 female and 276 male *D. tryoni*, 475 *Spalangia*. These were liberated as follows:

*Tetrastichus*: 2,700 Nuuanu Valley, 2,000 in the insectary, 800 Tantalus, 100 U. S. Experiment Station, 400 Piikoi St.

*D. fullawayi*: 588 Nuuanu Valley, 190 in the insectary, 35 U. S. Experiment Station, 35 Piikoi Street, 20 Kalihi, 230 Tantalus, 35 Pensacola St.

*D. tryoni*: 70 Nuuanu Valley, 10 Pensacola St.

*Spalangia*: 375 Waialae, 100 insectary.

In producing the above parasites there were used for *Tetrastichus* 3,000 pupae, and the parasitism is therefore in the neighborhood of 15%; for *D. fullawayi* about 21,000 pupae, parasitism 5%; for *D. tryoni* about 11,000 pupae, parasitism 1%.

Respectfully submitted,

D. T. FULLAWAY.

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Honolulu, May 31, 1915.

E. M. Ehrhorn, Esq., Superintendent of Forestry.

Dear Sir:—I submit herewith my report on the work of the insectary for the month of May, 1915:

Bred 21,800 *Tetrastichus*, 1,043 female and 2,086 male *D. fullawayi*, 348 female and 696 male *D. tryoni*, 900 *Spalangia* and small colonies of other fruit fly and dung fly parasites. Parasites were liberated in the following numbers at the places named:

*Tetrastichus*: 11,200 Nuuanu, 3,400 Tantalus, 1,500 Piikoi

street, 1,200 Insectary, 1,000 Hilo, 100 Koloa, Kauai, 20 Kaunakakai, Molokai, 200 Haiku, Maui, and 20 Waiakoa, Maui.

*D. fullawayi*: 659 Nuuanu, 101 Tantalus, 37 Piikoi street, 69 Insectary, 50 Hilo, 15 Haiku, Maui, 15 Waiakoa, Maui, 25 Koloa, Kauai, 8 Kaunakakai, Molokai.

*D. tryoni*: 172 Nuuanu, 26 Tantalus, 14 Piikoi street, 36 Insectary.

*African Spalangias*: 700 Moanalua, 200 Insectary.

*Opius humilis*: 100 Kaunakakai, Molokai; 50 Kalaupapa, Molokai, 200 Hilo.

*Philippine pteromolid*: 700 Moanalua.

*Muscidifurax vorax*: 700 Moanalua.

*Calesus silvertsi*: 250 Nuuanu.

*Dirhinus giffardii*: 50 Haiku, Maui.

In producing the above parasites there were used for *Tetrastichus* 4100 pupae, estimated parasitism 35%; 17,900 for *D. fullawayi*, estimated parasitism 6%; 3950 for *D. tryoni*, estimated parasitism 4%.

Respectfully,

D. T. FULLAWAY.

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## DIVISION OF FORESTRY.

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### REPORT FOR APRIL.

Honolulu, May 14, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit the following routine report for the Division of Forestry for the month of April, 1915:

#### KAUAI TRIP.

From April 21 to 24, I was on windward Kauai investigating the need for forest fences in the region of Anahola. The Makee Sugar Company last February completed the fence required by government lease on the Kealia Forest Reserve boundary across the mauka government lands of Kamalomalo and Anahola. In order to protect the rest of this reserve in the region of Anahola Ridge and prevent cattle from getting into the forest, it will be necessary for the government to build a fence beginning at the north end of this new fence and running east along the Anahola River, which is the reserve boundary, and around the point to the land of Aliomanu, a distance of approximately 2.7 miles. The fence should not end here, however, for if it did, cattle could still get into the reserve. It should therefore be continued approxi-

mately .8 mile north to connect up with the fence across the makai boundary of the Moloaa Reserve, recently completed by Mr. C. A. Rice. By building this 3.5 miles of fence the forest reserve in this region will be completely protected from cattle which now wander into it. I plan to use the services of our newly appointed Forest Ranger, Mr. Kaina D. Lovell, in constructing this fence.

A brief visit around Lihue, Kauai, showed the continued interest that is being shown in forest tree planting on an extensive scale by people who are now beginning to reap the harvest of earlier plantings and are selling the wood for local use.

#### FENCE WIRE.

Four bids were received on April 30 in response to the call for tenders for furnishing No. 8 galvanized fence wire, but those necessarily were all rejected on account of the desire, expressed at the Board meeting of April 28, that a better quality of wire with more lasting properties be used in our forest reserve fencing. In accordance with the directions of the Board I have inquired concerning the best quality of wire available and find that it would be useless to attempt now to secure English wire on account of the great uncertainty of delivery and very high price due to the war. I find that an American Special No. 6 extra heavy-coated galvanized fence wire manufactured by the American Steel & Wire Co. has been used with equal satisfaction as the English wire on Hawaii, and I propose soon to call for bids on a sufficient amount of this wire to fence twenty miles of forest reserve boundary.

#### GRASS CUTTING ON TANTALUS.

A complaint was received concerning grass cutting on Tantalus and was at once investigated. No permits have been issued since last summer for this purpose, but it seems evident that some loads of grass or honohono have been cut from time to time from the government forest reserve in this region. Ranger Kapihi was several times instructed to keep closer watch to prevent this trespass and he has been required to move up to his mauka house where he is now on hand to warn grass cutters to keep off the reserve.

#### APPOINTMENTS.

To fill the vacancy caused by the resignation of Mr. Wilbur A. Anderson, Mr. John S. Goodell of Nahiku, Maui, was on April 28 appointed District Fire Warden for that portion of Koolau, Maui, lying to the east of Makapipi Gulch.

On May 1, Mr. Kaina D. Lovell of Anahola, Kauai, was ap-

pointed Forest Ranger for that island. It is a pleasure to be able to take this advance step toward the better administration of our forest reserves. Ranger Lovell's work will consist chiefly in constructing fences at first, to be followed by the prevention of trespass and some planting work. He will continually be on the watch for forest fires.

#### APPLICATION FOR AWA.

An application was received during the month for permission to take awa from the unsurveyed government land mauka of the homesteads between Pahoa and Kaimu, District of Puna, Hawaii. On account of the absence of reliable precedent in handling such a permit, before referring the application to the Board I prefer first to investigate the matter on the ground in order to determine the value of the material to the government and the feasibility of issuing and handling such a permit.

A report on the activities in the department of the Forest Nurseryman is, as usual, appended to this report.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry.

#### REPORT FOR MAY.

Honolulu, June 10, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit the following routine report for the Division of Forestry for the month of May, 1915:

#### FENCING ON KAUAI.

The construction of the proposed 3.5 miles of fencing along the reserve boundary at Anahola, Kauai, mentioned in my April report, has not yet been started because as yet it has not been possible to secure the services of a local surveyor to run out two lines along the boundary of government land. These lines must be definitely located before the fence can be constructed and the building of the remainder of the fence would not be effective unless this gap is also fenced. I am in correspondence with parties who can do this surveying and hope soon to have it completed so that the fence construction can proceed.



## FENCE WIRE.

On May 15, a call was issued for bids for furnishing 520 coils of No. 6 gauge American special extra heavy-coated galvanized fence wire, bids to be opened early in June. This was the kind of wire found after inquiry to be the most durable wire available and decided upon with the Commissioners who were in town as being the best to use in our forest reserve fencing.

## FOREST FIRE NEAR HILO.

On March 29, 1915, a fire started on the Government leased land of Piihonua, near Hilo, Hawaii, and raging for four days before it was extinguished by men working under the direction of District Fire Warden John A. Scott, endangered cane fields and burned over some 200 acres of pasture and forest land belonging to the Hawaiian Evangelical Association, Lyman Estate, Hilo Sugar Co., and Ponahawai Coffee Co. It was started by a native who was burning brush when a strong wind came up and scattered the fire in spite of his efforts to control it. The fire did not reach within more than a mile of the Hilo Forest Reserve.

## TRIP TO MOLOKAI.

The last six days of May and a few days in June were spent on the Island of Molokai becoming acquainted with the condition of the forest reserve on that island. Most of the western end of the reserve on the leeward side of the island or all of the lands under the control of the American Sugar Co. in the reserve were fenced about 16 years ago and the results of keeping out the cattle and reducing the number of wild deer and goats are already most gratifying. Where the former damage was not unusually severe the native forest consisting mostly of Ohia lehua is coming back naturally in a profuse manner. Swamps that were formerly drying up on account of the damage to the forest are becoming very wet again and will soon be impenetrable on account of the bog and new forest growth. These good results are a strong argument in favor of the protection of our native forests. Where previous damage was excessive in this part of the reserve tree planting to a certain extent has been done by the American Sugar Co., with excellent results.

The conditions on the leeward side of this reserve further to the east, where very little government land is involved, are somewhat different. Here the country is more broken up by steep gulches and although there is practically no fencing along the forest reserve boundary, in only a few places on private lands have cattle gotten into the woods. There are no wild goats in this region. The majority of the lands here are privately owned

and as yet little fencing has been done by the owners on account of the expense. Almost all of the few strips of government land which run into the reserve have clauses in the lease of the land below the reserve boundary requiring fencing. While all of this fencing has not yet been completed, a start has been made by some of the lessees. The only unleased government land in this part of the reserve, in which the government owns a half interest, I found to be a very narrow ridge bordered by steep gulches. Cattle are entirely absent and no damage has been done to the splendid forest of young Ohia trees.

A curious and gratifying result of the killing of the lantana by blight in the gulches in this region has been the springing up of young Kukui trees in great quantities.

#### PUBLICATIONS.

Upon the exhaustion of Circular No. 2 of this Division, "Instructions for Propagating Forest, Shade and Ornamental Trees," by David Haughs, which is handed out to those who do tree planting, a new supply was printed during the month.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry.

#### REPORTS OF FOREST NURSERYMAN.

Honolulu, May 13, 1915.

C. S. Judd, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of April.

#### NURSERY.

##### *Distribution of Plants.*

	In seed boxes.	In boxes trans- planted.	Pot Grown.	Total
Sold . . . . .	....	....	80	80
Gratis . . . . .	....	....	915	915
	—	—	—	—
	....	....	995	995

## COLLECTIONS.

Collections on account of plants sold amounted to.....	\$ 1.80
Rent of building, nursery grounds, 4 mos., Dec. to Mar.	140.00
Total.....	<u>\$141.80</u>

## PLANTATION COMPANIES AND OTHER CORPORATIONS.

Under this heading the distribution of plants is as follows:  
 11,000 seedlings; 3050 in transplant boxes; and 300 pot grown  
 Total, 14,350.

## MAKIKI STATION.

The transplanting of seedlings, mixing and sterilizing soil and attending to the other trees of the station has constituted the principal work.

## HONOLULU WATERSHED PLANTING.

During the month the trails in the vicinity of Sugar Loaf hill have all been cleared. A new trail starting in the main Makiki Valley, about half a mile above the Makiki Station and running across the ridge to Herring Valley and continuing along the Ewa side of this valley until it joins the trail from Sugar Loaf below the springs has been completed. This trail will make it practical to use the small nursery at the base of Sugar Loaf while the planting is being done in Herring Valley and on the adjoining ridge.

As a protection against fires the clearing off of some of the old trails and making new ones where required is necessary work at this time. The dry season is coming in and the dense growth of Hilo grass which is to be found on those precipitous slopes would, in the event of a fire starting, make it very difficult to control. Consequently the trails have been arranged with this idea in view.

## ADVICE AND ASSISTANCE.

The writer has been called upon to make visits and give advice as follows: Visits to places in and around the city, 10; advice by telephone, 12; advice to people calling at the nursery, 8; advice by letter to people on the other islands, 4; total, 34.

Respectfully submitted,

DAVID HAUGHS,  
 Forest Nurseryman.

Honolulu, June 14, 1915.

C. S. Judd, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of May:

## NURSERY.

*Distribution of Plants.*

	In seed boxes.	In boxes trans- planted.	Pot Grown.	Total.
Sold . . . . .	.....	101	80	181
Gratis . . . . .	2000	1250	728	3978
	<hr/> 2000	<hr/> 1351	<hr/> 808	<hr/> 4159

## COLLECTIONS.

Collections on account of plants sold amounted to.....	\$ 5.40
Rent of buildings, nursery grounds.....	35.00
Total.....	<hr/> \$40.40

## PLANTATION COMPANIES AND OTHER CORPORATIONS.

The distribution of plants under this heading amounted to 3500 in transplant boxes.

## SEED COLLECTING.

The seed season for a large number of forest and ornamental trees is just coming in and the two collectors are kept busy. Tantalus and Nuuanu Valley have been searched in vain. No good Koa seed can be found. We are in hope of being able to procure some Koa seed from Kona and have written to a party who resides there about it.

## SEED EXCHANGE.

The seed exchange system started by us during the year 1907 and kept in operation ever since has been of mutual benefit to ourselves and also to Botanic Gardens, Experiment Stations, Nurseries and other institutions and individuals throughout the different countries listed below. Our foreign list contains the names of 79 institutions and individuals with whom we exchange seed from time to time. All of those named have received seed from

us during the past eight years and we have assurances from each that they will gladly forward full lists of samples at any time we desire same. We have received lists from a number of these. The lists comprise ornamental and forest trees, shrubs, creepers, palms and annuals. The number of species varies according to the size of the institution. The lists of seed sent out from the Nursery here generally contain about 100 species. By keeping in touch with those institutions we are in a position, should we at any time in the future find it necessary to do more experimenting with trees on the higher lands or elsewhere, to call on them for seed. The following is a list of the different institutions which constitute our seed exchange:

#### EXCHANGE LIST.

Gardens and parks, 2; nurseries, 4; acclimatization gardens, 1; botanic gardens, 53; forest departments, 4; experiment stations, 5; agricultural departments, 6; collectors, 4; total, 79.

The following is a list of the countries, giving the number of institutions, etc., in each with which we have been in communication and exchanged seed during the past eight years:

Africa, 8 institutions; Australia, 12; Argentina, 1; Belgium, 1; Brazil, 4; Cuba, 1; China, 2; Chili, 1; Ceylon, 1; Cochín China, 2; Great Britain, 2; Fiji, 1; France, 2; Germany, 1; Greece, 1; Guiana (British), 1; India, 12; Japan, 3; Java, 1; Federated Malay States, 2; New Zealand, 2; Peru, 2; Straits Settlements, 3; Tasmania, 1; West Indies, 12; total, 79.

In addition to the above we have on our regular exchange list and have exchanged seed with each of the following: The Forestry Department, Manila; the Experiment Station, Guam; and on the mainland: Botanic Gardens, Washington, D. C.; Arnold Arboretum, Massachusetts; Harvard Experiment Station, Cuba; Botanic Laboratory and Gardens, Johns Hopkins University, Baltimore, Maryland; Prof. Albert Akerman, School of Forestry, University of Georgia; Harvard Botanic Gardens, Cambridge, Massachusetts; Office of Seed Introduction, U. S. Department of Agriculture, Washington, D. C.; New York Botanic Gardens, Bronx Park, N. Y.; Botanical Desert Laboratory, Tucson, Arizona; Missouri Botanical Gardens, St. Louis, Missouri, and Acclimatization Society, Santa Barbara, California.

#### MAKIKI STATION.

In addition to the regular routine work some needed repairs have been made to the buildings. The boiler and sterilizer have been treated to two coats of paint and part of the buildings given a coat of green stain.

In addition to the regular stock of plants which are always in

demand we have at present at this station a number of plants raised from seed which we have received through our exchange system, a few of which are worthy of note. *Juniperus Australis*, about 2500 plants from seed received from Jamaica. Camphor tree, about 200 plants from seed received from Formosa. From Australia, *Maleluca*, three species (the paper bark tree of Australia). We have about 1000 plants of each species. Several species of *ficus* from India, including the *Ficus religiosa*, the sacred tree of the Hindoos. We have a number of other species containing small quantities of each coming along, some of which look very promising.

#### HONOLULU WATERSHED PLANTING.

The work done during the month has been principally hoeing, making holes and planting. The lower slope of Herring Valley is being planted with Kukui. 350 Kukui trees have been planted during this month. The trees formerly planted are doing very well and a large number of them are now above the grass and guava bushes and are able to take care of themselves.

#### ADVICE AND ASSISTANCE.

The writer has been called upon to make visits and give advice as follows: Calls, 6; advice by telephone, 10; advice at nursery, 8; by letter, 4; total, 28.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

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#### DIVISION OF HYDROGRAPHY.

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#### REPORT FOR APRIL.

Honolulu, May 11, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography during April, 1915, is submitted:

#### WEATHER CONDITIONS.

The early part of the month was extremely dry. On April 8 the drought was broken on Maui and all East Maui ditches were filled to capacity. During the middle of the month light rains fell generally over the islands and during the week ending April 24, the precipitation was, with a few exceptions, above the average.

During the latter part of the month heavy rain storms occurred in the Hilo, Hamakua and Puna districts on Hawaii; and at several points on Kauai, Maui and Oahu. At Hana, Maui, on April 27, 24.3 inches of rain fell in three and one-half hours, and a great damage was done to roads, bridges and crops. On Oahu heavy rainfall during the last week of the month enabled us to obtain much needed flood measurements on the stations maintained in coöperation with the Kahuku and Laie plantations. These stations were established to determine the feasibility of storing storm water in that vicinity for irrigation of fields that are now irrigated by pumped water.

On Kauai heavy rains fell after April 20. On April 27th four inches of rain fell on the McBryde Plantation, and the Wainiha Power Plant was shut down as not being needed,—the first time in three years.

#### 1914 RAINFALL RECORDS.

That the Hawaiian Islands were bountifully supplied with rainfall during 1914 is demonstrated by the following records which have just been completed. These are only part of the stations maintained by the Division of Hydrography, or to which private records are furnished.

##### KAUAI.

Mt. Waialeale, elevation 5080 feet, over 600 inches. (Partially estimated).

Hanapepe Valley, elevation 2080 feet, 256 inches.

Wainiha Valley, elevation 700 feet, 223 inches.

Wainiha Power House, elevation 125 feet, 186 inches.

Wainiha Ridge, elevation 1900 feet, 224 inches.

Lehuamakano, elevation 3930 feet, 186 inches.

Kapaka, elevation 635 feet, 182 inches.

##### OAHU.

Nuuanu Pali, elevation 1200 feet, 138 inches.

Wahiawa (mauka), elevation 1200 feet, 230 inches.

##### MAUI.

Waihee Valley, elevation, 1500 feet, 460 inches.

Puu Kukui, elevation 4300 feet, 429 inches.

Kearae, elevation 1000 feet, 397 inches.

Iao Valley, elevation 1500 feet, 240 inches.

Honokohau, elevation 800 feet, 255 inches.

Kula Pipe Line, elevation 4300 feet, 330 feet (about).

Honolua Ranch, elevation 800 feet, 255 inches.  
 Mt. Eke, elevation 4500 feet, 270 inches (about).  
 Honomanu, elevation 1800 feet, 361 inches.  
 Kopiliula, elevation 1225 feet, 356 inches.  
 Waikamoi, elevation 1275 feet, 392 inches.

#### HAWAII.

Kahawainui (Upper Hamakua Ditch), elev. 4080 ft., 504 in.  
 Alakahi (Upper Hamakua Ditch), elev. 3870 ft., 350 in.  
 Kahawainui (Lower Hamakua Ditch), elev. 1040 ft., 308 in.  
 Koiawe (Upper Hamakua Ditch), elev. 3350 ft., 217 in.  
 Koiawe (Lower Hamakua Ditch), elev. 1000 ft., 211 in.  
 Waima (Lower Hamakua Ditch), elev. 980 ft., 192 in.

#### CHANGES OF PERSONNEL.

C. T. Bailey, assistant engineer, sailed on the April 5th U. S. Army transport to spend three months accumulated leave on the mainland, and three months in the Washington, D. C., office of the U. S. Geological Survey on general office and executive training work. He expects to return to Honolulu about November 13, 1915.

R. C. Rice, formerly office engineer for the California district of the U. S. Geological Survey, arrived on April 13, and will act as office engineer for this Division in the future.

The services of R. D. Kliss, assistant engineer, of the Philippine service, have been secured, and Mr. Kliss will report for duty about July 1st.

#### *Kauai.*

The construction work on the new Kapaa stream and ditch measurement stations was practically completed. Floods during the latter part of the month delayed this work. All stations in the upper Waimea water shed were visited and minor repair work was done. All continuous record stream measurement stations on windward Kauai were visited.

Mr. Hardy spent 25 days in the field, visited ten stream measurement stations, and made 15 stream measurements. Mr. Horner spent 28 days in the field, principally on construction work.

#### *Oahu.*

Three coöperative continuous record stream measurement stations were established in the upper Punaluu and Kaluanui valleys. The cost of these stations was paid by the Koolau Agricultural Co., Ltd. The stations will be used to determine whether



the Punaluu and Kaluanui Streams may be used to develop hydro-electric power for pumping on Kahuku Plantation.

Miscellaneous measurements were made of the outflow from the Waiawa portal of the Waiahole tunnel, the flow from the new Y. M. C. A. well, and of the Afong ditch in upper Nuuanu Valley.

G. K. Larrison spent 13 days in the field, visited four stream and two rainfall measurement stations, and made three miscellaneous measurements.

H. A. R. Austin spent 23 days in the field, visited 20 stream and three rainfall measurement stations, and made 18 stream and ditch measurements at regular stations and nine miscellaneous measurements.

R. C. Rice spent 11 days in the field, visited two stream measurements at regular stations and one miscellaneous ditch measurement.

The outflow from both portals of the Waiahole tunnel continues to diminish. The Waiahole portal, including "R" tunnel, now has a discharge of 28 million gallons per day, and the Waiawa portal 13 million gallons per day.

#### *Maui.*

Only routine maintenance work was done. G. K. Larrison visited all continuous record stream measurement stations, and one rain gage on the Iao Valley tableland. This rain gage had been tampered with and the receiver reversed so that the annual record was spoiled. The gage was also badly battered, apparently by a cane knife.

#### *Hawaii.*

G. K. Larrison spent five days in the vicinity of Waimea making measurements in the Waikoloa drainage area, locating old ditches and assisting the Attorney-General in collecting evidence relative to the flow of the stream and the ditches diverted therefrom.

#### MAY PLANS.

Kauai.—The Kapaa measurement stations will be completed. New copper rain gages of increased capacity will be established on Kilohana lookout, elevation 4020 feet and Mt. Waialeale, elevation 5080 feet.

Oahu.—Make needed measurements to complete ratings of stream measurements stations, and make minor repairs to existing stations.

The commanding officer of the Hawaiian Department U. S. Army has requested that this office make "an examination of con-

ditions affecting the water supply at Schofield Barracks," and advise him on the subject. The examination and report will be made during May.

Data relative to the Honolulu water supply will be prepared, and furnished to the City and County Engineer.

Maui.—A large amount of minor repair and maintenance work will be done, and stream measurements will be made. The Iao tableland rain gage will be moved to a more secluded locality.

Hawaii.—G. K. Larrison will be subpoenaed to appear as a witness at Waimea, Hawaii, about May 26, to furnish evidence pertaining to the Waikoloa water case.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

#### REPORT FOR MAY.

Honolulu, June 9, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography during the month of May, 1915, is submitted:

#### WEATHER CONDITIONS.

There was light to moderate rainfall throughout the islands during the first part of May. During the latter part of the month only light showers occurred and the precipitation was generally below the average. Kauai showed the lowest average monthly rainfall in the island group,—below one inch. On May 21, when Mr. Hardy visited Mt. Waialeale, Kauai, elevation 5080 feet, the effect of this deficient rainfall on the high mountains was very noticeable.

#### KAUAI.

During the month construction work was completed on the new gaging stations on Kapaa Stream and Kapaa ditch. Construction work on the new gaging station on Anahola ditch was practically completed.

A 300-inch rain gage was installed on Mt. Waialeale, elevation 5080 feet, and a rain gage on Kilohana lookout, elevation 4020 feet, was replaced by one of 120 inches capacity.

Most of the gaging stations on Kauai equipped with water stage registers were visited during the month, and necessary minor repairs made.

Mr. Hardy spent 26 days in the field, visited 18 stream and five rain gage stations, and made 16 regular and one miscellaneous discharge measurements.

Mr. Horner spent 28 days in the field on construction work, visited eight stream measurement stations, 14 rain gage and three evaporation stations, and made four discharge measurements.

#### OAHU.

A gaging station was established on a ditch that diverts from East Branch of Manoa Stream above our gaging station. Maintenance work was done on several stations in the vicinity of Kahuku.

A field examination of conditions affecting the water supply at Schofield Barracks was made at the request of the commanding officer of the Hawaiian Department, U. S. Army. A report of this examination is in preparation.

Necessary low stage discharge measurements were secured at several of the gaging stations.

The outflow of the Waiahole portal, including "R" tunnel, of the Waiahole tunnel was found on May 7 to be 28 million gallons per day. Inflow between the Waiahole portal and the Division of Hydrography gaging station below the power house, including discharge from "A" tunnel, amounted to about five million gallons per day.

At the request of the Governor, a topographic map of Oahu was prepared in colors, showing the areas of land owned by the Territory, Army and Navy reservations, homesteads, and forest reserves, and the locations of the stream gaging stations and rainfall stations maintained in coöperation with the U. S. Geological Survey. This map shows in a comprehensive way the economic relation of the surface water investigations to the territorial land divisions of Oahu.

G. K. Larrison, superintendent, spent five and one-half days in the field chiefly in connection with the field examination of the water supply for Schofield Barracks, and visited five stream measurement stations inspecting the water stage registers. He was on leave one day.

C. T. Bailey, assistant engineer, was on annuai leave the entire month.

R. C. Rice, assistant engineer, spent most of the month in the office computing water stage register records, ararnging technical files and preparing rating curves for several stations. He spent one and one-half days in the field, visited five stream and one ditch stations and made two measurements at regular stations.

H. A. R. Austin, junior engineer, spent eight days in the field, visited 13 stream and four rainfall stations, and made seven regular and six miscellaneous discharge measurements.

## MAUI.

Much needed repairs were made to the gage well and cable equipment at the Iao station. A new 300-inch rain gage was installed at Waihee to replace the old one which leaked.

The Iao tableland rain gage was moved to a more secluded locality where it is hoped it will not be again tampered with.

H. A. R. Austin spent 12 days in the field, visited 18 gaging stations, three rain gage stations, and made one regular and two miscellaneous measurements.

## HAWAII.

The water rights suit brought by the Parker Ranch against the Territory opened this month at Waimea, Hawaii. The case involves the adjudication of the water rights in Waikoloa stream.

G. K. Larrison, superintendent, representing the Division of Hydrography, spent May 23 to 31 at Waimea as a witness for the attorney-general. At the close of the month he was still at Waimea.

## JUNE PLANS.

Kauai.—Considerable minor repair and maintenance work will be done and discharge measurements secured.

Oahu.—Several minor repairs and maintenance work will be done, and measurements secured where needed.

Maui.—Necessary repairs will be made and measurements secured.

Hawaii.—G. K. Larrison will be at Waimea as a witness on the water right suit between the Parker Ranch and the Territory.

Very respectfully,

ROGER C. RICE,  
Acting Supt. of Hydrography.

## FUNDAMENTAL PRINCIPLES OF CO-OPERATION IN AGRICULTURE.

BY G. HAROLD POWELL.

*(Circular of College of Agriculture, University of California.)*

(Concluded.)

### MEMBERSHIP AGREEMENT.

A coöperative organization to be successful must be held together by a membership agreement or contract holding the members together for business purposes. In no other way can an association attain that degree of stability that is necessary in a business undertaking. The association must know definitely what it is expected to do, the volume of business to be handled, the expenses to be incurred and the preparation necessary to be made to transact its affairs in an orderly, economical manner.

Voluntary membership is usually suicidal in a coöperative association. In the last analysis the association can only succeed when the average member believes that the coöperative principle is sound; and that conviction must be strong enough to hold the members together when their opponents attack them insidiously and persistently. This faith must be founded on the sound business results of the organization, as well as on its larger influence on the development of the industry as a whole. Unless the benefits of the organization are large enough to keep the organization intact, the members cannot be held together indefinitely by any form of contract; but the human nature of the average farmer has not evolved to that ideal point when a temporary advantage offered him by an opponent may not blind him to the permanent advantages of the association to which he belongs. A membership agreement is a steadying influence on a grower who might be led astray by misrepresentation or by temporary dissatisfaction. Then, too, there are large numbers of farmers who are opportunists. They have no interest in the industry as a whole. They are interested only in their own immediate success. In handling their crops they are rampant speculators. They follow a sharp-shooting marketing policy, trying to hit the high spots presented by an association, a buyer, or a commission merchant and giving but lukewarm allegiance to any individual or association. The opponents of the coöperative system understand this psychological trait perfectly, and unless the producer has formally bound himself to his association by a definite contract to handle all his produce through it for a given period of time they draw heavily from the membership by promising a larger return, or by playing upon his prejudices in other ways. It is

an historical fact that a large proportion of the troubles and failures in the coöperative movement have been due to the irresponsibility of the membership whenever an association has been subjected to fire; and no one not experienced in the movement can have any conception of the degree to which misrepresentation, insinuation and other modes of creating disaffection are persistently kept before the coöperative producers by those who make an abnormal profit when the farmer's product is handled individually. The same kind of misrepresentation is used in building up one association as against another when those who handle the business of a coöperative association are interested in profits, or derive their compensation from the volume of business handled.

#### THE MANAGEMENT OF A COÖPERATIVE ASSOCIATION.

The success of a coöperative organization depends primarily on the loyalty and stability of the membership; it depends further on efficiency in management. Efficiency in management cannot exist without stability of membership; nor can it be developed unless the members appreciate the necessity of providing an efficient management. The difficulty in most coöperative organizations is the lack of appreciation of the need of a high order of organizing and business ability on the part of the employees of the association. The common failure of coöperative associations is usually attributed to inefficient management; as a matter of fact, it is due to the membership itself, which has fallen short in securing skillful employees. The individual producer is likely to gauge the requirements of management by the size of his own business. He falls short in his estimate when he acts on a board of directors and is charged with the responsibility of providing a management to handle successfully a collective business. Inefficient management is a measure of the degree of business efficiency of those who are charged with the direction of the affairs of the association; and unless the membership will sustain a board of directors in employing men of a high order of ability a coöperative association is short lived.

The management of a coöperative organization is more difficult than that of an ordinary corporation. The stockholders, not being experts in the affairs of the latter, do not often take an active interest in its details. The producer, on the other hand, is vitally interested in his own business and he is likely to take an active part, at least in giving advice concerning the conduct of the business. This is one of the most valuable assets in a coöperative organization if the manager is big enough to utilize it. Through the knowledge of the producer in the affairs of his association his interest and sympathy can be kept vital. If the management becomes autocratic, the interest of the member dies; if it is not big enough to work out a broad, progressive business policy, using

such suggestions as are made by the producers in addition to its own knowledge and experience, it in turn loses its connection with the association. A management must possess tact, constructive ability, foresightedness, fearlessness in the conduct of the business and a clear conception of the real underlying purpose of the organization, if it is to succeed. The integrity of the management must be beyond reproach; it must be free from entangling business alliances; it must be free from the participation in any secret profits arising directly or indirectly from handling the business of the organization; in short, the dealings of the management with the organization must be an open book, free from questionable business practices of every kind. The influence of the management, next to the loyalty of the members, exceeds all other influences and the success of a coöperative association depends on its working out in mutual confidence an efficient business system that is able to meet successfully all conditions as they arise.

#### A COÖPERATIVE ORGANIZATION SHOULD BE FOUNDED ON A SPECIAL CROP.

A coöperative organization should be founded on a special crop and the locality in which it handles the product should be comparatively restricted. Special industries involve common problems to be solved by the producers, similar difficulties to overcome, similar trade practices and similar trade connections. The members of an organization that is formed to handle fruit, vegetables, poultry and general farm crops have no common ground on which to stand, and these general associations have not been successful up to the present time because the membership cannot be held together. The citrus fruit growers of California are all interested in increasing consumption, in extending markets, in reducing the cost of distribution and marketing, in securing reasonable transportation costs, and in the same public policy questions that affect the industry. They have therefore developed a vitality in their organizations that have been attained in no other agricultural industry in America. An organization founded on different crops, on the other hand, has a series of totally different problems to meet at one time, different business connections to form and different classes rather than one class of opponent to meet.

#### A COÖPERATIVE ORGANIZATION MUST DEVELOP THE INDIVIDUALITY OF EACH LOCALITY.

To be successful a coöperative association must sustain and develop the individuality and initiative of the different localities in which it operates. The unit of the organization must therefore be a locality in which the soils, the climate and other conditions produce a similar grade of product. If the products vary

widely in color, texture, form or in other character, on account of the conditions under which they are grown, the producers cannot be held together because the grades cannot be made similar. The attempt to have a single organization cover a wide territory is therefore likely to fail. No amalgamation of the farmers of different localities in a common organization has ever been successful. On the other hand, the orange growers of one locality or of similar parts of a locality which produces similar grades of fruit, may organize to prepare their product for market under distinct local brands. Those of another may do the same thing, and a large number of local units may be formed as long as the unit embraces a product of similar grades and character. Then as a matter of economy and efficiency these local units may federate and create a central agency through which they handle their common problems. But each local unit preserves its local character and develops its local pride and reputation by selling its products under a brand that is the exclusive property of the local association. In addition to its local brand it may also add a brand of the central agency in order to give it greater selling power in all parts of the country; but no local unit should use the brand of a central agency exclusively, without using its own brand at the same time.

#### HANDLING, GRADING, AND PACKING.

The outcome of a coöperative organization formed to handle the growers' product will succeed or fail on the skill and integrity with which the product is harvested, handled, graded, and packed. The limits of this discussion will not permit this part of the subject to be handled in detail. A few fundamental principles, however, can be stated:

1. In the average association the individual grower does not possess sufficient skill to harvest, handle, grade or pack his product carefully, uniformly or attractively enough to permit the association to establish a standard of quality and therefore acquire a reputation for its brands or grades. A uniform standard of quality in the brands shipped by an association is fundamental to success. This seems like an axiom, but the fact is that this is the rock on which many coöperative organizations have been dashed to destruction. Poor handling in harvesting, improper handling in preparing the product for sale, careless or dishonest grading, or lack of skill and knowledge in grading and packing—these are common rather than unusual conditions in the conduct of many coöperative associations where the handling of the product is controlled by the individual members. The output of an association, therefore, acquires no stable merchandise value. The brands are not a guarantee of quality.

2. A reputation for uniformity in grading and packing can



only be acquired when the product of all of the members is handled under uniform conditions. The standardization of a product can result only from standardizing its handling, grading, and packing.

3. A uniform product can be established by having the product of the individual members handled by the members, under the supervision of the association, or for the members by the association. The former method is employed successfully in some deciduous fruit associations; the latter is the usual method in the citrus fruit associations. The conditions which lead to either method are local as well as those of the industry in question. In the citrus industry the crop is harvested over a long period of time and is comparatively non-perishable. It is possible therefore to systematize the methods of handling, to assemble the product in a central packing house, and to grade and pack it under standard rules. Without this standardization of handling, grading and packing, no coöperative association can acquire an asset in the reputation of its brands. With standardization it can acquire a reputation which makes its output sought after and for which the trade will pay a premium. A practical difficulty in handling a coöperative association lies in the fact that every member thinks that he produces a product that is the equal or superior to that of every other member. The handling of this condition is one that tests the tact of the most successful manager. It is a practical condition, however, and not a theory, and must be met with firmness, with justice and with patience by every coöperative association.

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The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

**G. K. LARRISON,**  
**Superintendent of Hydrography.**

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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugus, Forest Nurseryman, Box 207, Honolulu, Hawaii.

C. S. JUDD,  
Superintendent of Forestry.

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### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the also specimens of the injury. In a tin with a hole or two, or a wood box specimens may be mailed by parcels post. When specimens not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications to  
**SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,  
Superintendent of Entomology



# THE HAWAIIAN FORESTER AGRICULTURIST

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Vol. XII.

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The Wood Waste Exchange of the federal department of agriculture appears to be an exceedingly important economic factor. Perhaps the workshops here using the beautiful Hawaiian hardwoods might make something out of it, therefore a press notice of the institution is elsewhere printed.

---

In his report for July the Territorial veterinarian explains an error in his July report, which did some injustice to both Moku-leia ranch and Pond's dairy.

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Dr. Nörsgaard, in reference to hog cholera, repeats in his report for June the advice of former reports with regard to feeding and sanitation as the best preventives of disease in herds of swine.

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Results of the initial campaign against bovine tuberculosis on Hawaii, "the big island," are highly encouraging.

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It is to be hoped that the efforts of the Territorial veterinarian to procure a visit to the Territory by the chief of the Bureau of Animal Industry, Washington, D. C., will be successful. Dr. Nörsgaard's attendance at the national convention of veterinarians in Oakland this month, which has been arranged for, will do much to put Hawaii on the animal industry map of the Union as well as bring valuable returns to these islands.

---

Three pests were nabbed by Entomologist Ehrhorn in June, outside of various lots of contraband plants which he had either destroyed or returned. It would seem that there is no end to the ignorance, prevailing in foreign parts, of United States regulations forbidding the entrance of fruit and vegetable stuff in baggage and mails.

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The new edition of Mr. Rock's book on Hawaiian forests will be awaited with keen interest here and abroad.

---

Results of fencing the Territorial forest reserves have been so obviously profitable that expenditures on that account must be regarded as among the soundest of investments.

That profit from forest culture is not, in these islands, a matter of legacy to future generations, but something to be enjoyed in the lifetime of the tree planter, is made evident in the article by the Superintendent of Forestry, Mr. Judd, in this number, giving the results from an ironwood grove on Kauai.

More than 10,000 plants distributed in May and June to the general public, with nearly 13,000 to plantation and other companies, by the Government nursery is "going some," but when on top of these numbers the nurseryman engages to deliver 50,000 seedlings between the middle of July and the end of August, to such corporations, a faint idea of what is doing in forestation in these islands may be gained.

Much work in June is reported by the Superintendent of Hydrography, whose division not only measures the water resources of the islands but aids in solving the water problems of plantations, municipalities and the national military establishment in the Territory.

All interested in the fruit industries of Hawaii—which must include everybody—will wish good luck to Mr. Fullaway in his search for a melon fly parasite in India.

#### GOOD IRONWOOD YIELD.

The following data concerning the yield of timber from a planted grove at Lihue, Kauai, may be of interest to those readers of the Forester who are engaged in tree planting:

Ironwood trees of the species known as *Casuarina quadrivalvis* were cut in April, 1915, on a plot of land a little over half an acre in area near the Lihue church, Lihue, Kauai. These had been planted in 1896 and up to the time of the final cut the plot had been thinned out several times. The cut from this plot of .6 acre was 226 trees which yielded 39 cords of firewood. At this rate the yield in wood for this species in this locality should be 65 cords per acre at the end of 19 years, which represents a growth of 3.42 cords per acre per annum. This is a better showing than available records of the yield in woodlots of blue gum, *eucalyptus globulus*, in these islands.

The wood of this ironwood is excellent for fuel and it is used extensively for this purpose in Lihue, where it now sells for \$8 per cord, delivered. The tops and branches even down to one inch in diameter, as well as the main trunk, are sold and used.

C. S. JUDD, Superintendent of Forestry.

*BOARD MEETING ITEMS.*

Following are items of public interest from the approved minutes of the Board of Commissioners of Agriculture and Forestry, being of a meeting held at the office of Commissioner Dowsett on July 15, at which were present Albert Waterhouse, president; H. M. von Holt and A. H. Rice, members; C. S. Judd, Executive Officer, and E. M. Ehrhorn, Superintendent of Entomology.

*IMPORTATION OF FORMOSA CROW.*

Mr. Muir's application of May 25 in which he requested permission to import into the Territory for liberation the Formosa crow, a bird which he considers will be beneficial, was again presented for action. The Superintendent of Entomology, upon question of the chairman, stated that he had gone into the matter to considerable extent and from all information gathered he was of the opinion that there was absolutely no danger in introducing it into the Territory. The question arose as to whether or not the bird is of a carnivorous nature and if the disease known as surra exists in Formosa. After some discussion it was thought advisable to confer with the Superintendent of Animal Industry in this regard before taking definite action. It was thereupon moved by Commissioner Rice, seconded by Commissioner von Holt and unanimously carried that Mr. Muir's application be granted subject to the approval of the Superintendent of Animal Industry.

*CLAIMS FOR FIGHTING FOREST FIRE.*

Chairman Waterhouse called to the attention of those present two bills dated March, 1915, which he had received from the Hilo Sugar Company, \$91.35, and from the Hawaii Mill Company, \$210.45, for labor in fighting a forest fire on the Punohoa mauka land near Hilo. After a short discussion and the Superintendent of Forestry advising that the Attorney General recommended that same be paid in accordance with Section 492 of the Revised Laws of 1915, it was moved by Commissioner von Holt, seconded by Commissioner Rice and unanimously carried, that same be approved and sent to the Auditor for payment.

*APPLICATION W. F. BARTELS.*

Regarding the application of W. F. Bartels dated June 7, 1915, for permission to use for agricultural purposes a parcel of land consisting of forty acres together with an allowance of pasture land within the South Kona forest reserve, Hawaii, after a short discussion and those present concurring that it would be inconsistent with the general forest reserve policy, it was unanimous-

ly voted upon motion of Commissioner von Holt, seconded by Commissioner Rice, that same be not granted, and Mr. Bartels to be so advised.

#### RE DAIRY LIVESTOCK INSPECTOR.

Regarding the deferred action of the Commissioners as to the reappointment of Mr. Joseph Richards in the Division of Animal Industry, the chairman read a letter from the Superintendent of that Division dated July 15, 1915, recommending that he be reappointed dairy livestock inspector at such salary as the Commissioners see fit to allow; the City and County, he advised, had appointed Mr. Richards dairy stock inspector and had appropriated the sum of \$50 per month for transportation in carrying on the work, said appointment to take effect July 16, 1915. He also advised that the Superintendent of Animal Industry had suggested that Mr. Richards be allowed a salary of \$100 per month and an extra allowance of \$25 per month for the upkeep of a horse and rig, thus allowing \$25 per month for the upkeep of the automobile on tuberculosis control work; it was thought the work could be accomplished more satisfactorily if separate transportation were provided. It was thereupon moved by Commissioner von Holt, seconded by Commissioner Rice, that beginning July 16, 1915, Mr. Richards be appointed as dairy livestock inspector of the Board at a salary of \$100 per month and an arrangement made whereby the extra allowance of \$25 per month for transportation will be made. Upon vote same was unanimously carried.

#### LETTER TO MAYOR LANE.

The chairman read the draft of a letter dated July, 1915, addressed to Mayor John C. Lane regarding the milk supply of the City and County of Honolulu, and advising that the Board will be glad to coöperate in every way possible with the Board of Supervisors to better conditions. Upon motion of Commissioner von Holt, seconded by Commissioner Rice, the letter as read was accepted.

#### RE RULE VIII, DIVISION OF ANIMAL INDUSTRY.

Chairman Waterhouse read the draft of a proposed rule of the Division of Animal Industry regarding the importation into the Territory of virus for the treatment of hog cholera. Those present concurred that said rule be submitted to the Attorney General in regard to form as well as to the legality of taking such action. Same was made a motion by Commissioner von Holt, seconded by Commissioner Rice and unanimously carried.

A communication from P. M. Pond dated July 12, 1915, re-

garding the hog cholera situation on the Island of Oahu, was presented by the chairman, Mr. Pond requesting the Board to import into the Territory virus for hog cholera treatment or draft regulations whereby it may be imported. The draft of a letter to Mr. Pond, dated July 15, was also read in which it was advised that before definite action is taken in regard to the serum simultaneous method of vaccination the Board desires to look further into the matter, and would await the results of the annual meeting of the American Veterinary Medical Association which convenes in Oakland, California, from August 30 to September 3, inclusive, at which time the subject of hog cholera and its treatment will be thoroughly discussed. Upon vote the letter as read was accepted.

RE LEAVE OF ABSENCE DR. NORGAARD.

A request dated July 15 was presented from the Superintendent of Animal Industry that he be delegated by the Board to attend the annual meeting of the American Veterinary Medical Association, also requesting the sum of \$250 for expenses. After a short discussion and those present concurring it was moved, seconded and unanimously carried that Dr. Norgaard be delegated to attend the Association meeting and that he be allowed a leave of absence of six weeks from August 17 as well as the sum of \$250 to cover expenses.

RE INCREASE IN SALARY, DAVID HAUGHS.

The Executive Officer called the attention of those present to an item in the budget for the biennial period ending June 30, 1917, allowing an increase in the salary of the Government Nurseryman of \$25 per month. Mr. Judd stated that Mr. Haughs had worked faithfully for the Board for the past several years and recommended that the increase be allowed. Upon vote the recommendation was unanimously carried.

RE LETTER OF CREDIT D. T. FULLAWAY.

Upon motion of Commissioner Rice, seconded by Commissioner von Holt and unanimously carried, the Executive Officer was authorized to arrange for a letter of credit for \$1500 in order to supply D. T. Fullaway with funds on his forthcoming trip to India in search of a parasite on the melon fly (*Dacus cucurbitae*). The Executive Officer advised that Mr. Fullaway was leaving on the 23rd inst.

## DIVISION OF ANIMAL INDUSTRY.

Honolulu, June 30, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to submit herewith a report on the work of the Division of Animal Industry for the month of June, 1915:

## BOVINE TUBERCULOSIS.

In last month's report a mistake occurred in that Mr. Pond's dairy farm at Mokuleia was referred to as the Mokuleia ranch. As the latter belongs to the Oahu Railway & Land Company and as five cases of tuberculosis were reported to have occurred there it is but just to state that the cases in question occurred in the Pond dairy and not on the Mokuleia ranch. In justice to the dairy, however, it should be added that the same has been free of tuberculosis for a long time and that the cases in question resulted from an unfortunate mistake in introducing new stock which erroneously was supposed to have been tested by this office. The reacting animals were removed from the premises at once. With the exception of a few family cows no tuberculin testing was done during the month of June.

## HOG CHOLERA.

The two outbreaks of hog cholera which occurred during May were brought well under control by means of the serum treatment and so far as is known the disease remained confined to these two herds. An effort is now being made to ascertain what truth there may be in certain rumors to the effect that the disease has occurred in various other localities on Oahu. This, however, is no easy matter owing to the reluctance on the part of many owners, especially among the Orientals, to admit losses of live stock or the presence of disease among them. When to this is added that the symptoms of swill poisoning often resemble those of hog cholera sufficiently to puzzle the veterinarian, and with immense quantities of swill being fed on Oahu, it becomes exceedingly difficult to gain any definite information beyond the fact that wherever swill is fed losses will occur, the extent of which cannot always be said to have any direct relation to care and sanitation, but which probably can be controlled in most cases by varying the swill diet with other feeds and good pasturage. Hog raising on a large scale has been an unknown industry here until quite recently and has to a great extent been in the hands of the Oriental population. In other countries it has long been realized that while there are large profits and quick returns there are also exceedingly great risks in bringing together large numbers of hogs, and that these risks are multiplied

when swill constitutes the main feed. So far as I have been able to ascertain no hog cholera or any other disease of an endemic nature has occurred here among hogs fed in a rational way, that is, corn or other grain, roots and field crops, especially alfalfa, and when kept under sanitary conditions with access to pasture and plenty of fresh water. On the Parker ranch for instance hundreds of hogs are raised annually without losses worth mentioning. To assume that any form of serum or other treatment can take the place of sanitation and experience or can balance a one-sided ration is fallacious, but where losses are due to infection from disease-producing bacteria much can undoubtedly be gained by judicious treatment. Nor can it be gainsaid that hog raising methods have been revolutionized on the mainland of the United States since the general use of anti-hog cholera serum has so effectively reduced the animal losses from this disease and given an impetus to hog raising never known before.

#### VETERINARY CONVENTION IN OAKLAND, CAL.

The success of this new treatment is due almost exclusively to scientists of the federal Bureau of Animal Industry and to the state livestock sanitary officials as well as the practicing veterinarians of the United States. It is estimated that nearly one thousand of these official and private veterinarians will meet in Oakland, California, the latter part of August this year, for the purpose of exchanging ideas and experience relative to the control and suppression of infectious and contagious diseases among live stock, and with a view to the ultimate eradication of such scourges as bovine tuberculosis, hog cholera, rabies, Texas fever and foot and mouth disease. The value of such an opportunity to exchange ideas and come in direct communication with men of great experience on the subjects which are confronting us here in Hawaii cannot be overestimated, and the writer takes the opportunity herewith to thank the Board for delegating him to attend the 53rd annual convention of the American Veterinary Medical Association in Oakland next month.

While the hog cholera serum which has been used here up to the present time may have been everything that could be expected, an opportunity will also be afforded at this meeting to learn which of the more than ninety authorized manufacturers produce the most reliable serum. More than \$60,000 worth of spurious or inferior serum has been confiscated by federal inspectors, and it is not impossible that the quantity which reached Hawaii has not all been of the best. Some of it at least has been decidedly foul smelling when opened and much of it has contained so much sediment as to make it difficult of administration. It may be taken for granted that every manufacturer of serum will have an exhibit at or near the convention hall and that unpreju-

diced opinions as to their relative values may be obtained from friends and colleagues among the federal and state officials present.

Uniform rules and regulations for the inspection and testing of live stock in interstate traffic as well as for methods of dealing with outbreaks of infectious diseases in general and with bovine tuberculosis in special are among the other subjects of interest to this Territory which will come up for discussion.

An effort to induce the chief of the Bureau of Animal Industry or one of his divisional chiefs to visit this Territory in person, and preferably as soon as the Oakland convention has adjourned, is already under way and will, if successful, be of value to the various branches of the local live stock industry not alone on account of the expert advice and suggestions he may be able to offer, but also in imparting to an influential federal official an opportunity for personal observations on live stock conditions in this isolated island possession of the United States and its ability to care for itself under possible future world complications.

#### TRANSPORTATION OF LIVE STOCK.

The following live stock arrived at the port of Honolulu during the month of June:

June 1—S. S. Lurline: 9 horses, 20 mules, 22 cattle, 1 hog, 19 crates poultry.

June 8—S. S. Wilhelmina: 22 crates poultry.

June 15—S. S. Manoa: 9 hogs, 18 crates poultry.

June 22—S. S. Matsonia: 3 dogs, 31 crates poultry..

June 25—S. S. Makura: 1 dog.

June 28—S. S. Sierra: 36 crates poultry.

June 29—S. S. Lurline: 6 crates poultry.

From the island of Hawaii the Assistant Territorial Veterinarian reports having tested 158 head of cattle belonging to 51 owners. Of this number two stables were found infected with respectively three and two reactors.. This condition must be said to be highly favorable to the speedy eradication of tuberculosis on the big island.

No cases of hog cholera have come to notice during the past three months on either Hawaii or Maui.

Respectfully submitted.

VICTOR A. NORGAARD.  
Territorial Veterinarian.



## DIVISION OF ENTOMOLOGY.

Honolulu, June 30, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of June, 1915, as follows:

During the month 59 vessels arrived at the port of Honolulu of which 24 carried vegetable matter and two vessels carried moulding sand. Of these vessels eight came via the Panama Canal.

<i>Disposal.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	1,122	18,864
Fumigated . . . . .	2	2
Burned . . . . .	38	38
Returned . . . . .	1	1
Total inspected.....	1,163	18,905

Of these shipments 18,674 packages arrived as freight, 103 packages as mail matter and 128 packages as baggage of passengers and immigrants.

## RICE AND BEAN SHIPMENTS.

During the month 24,977 bags of Japanese rice, 76 bags of Chinese rice, 1996 bags of Japanese beans and 193 bags of sorghum seed arrived, and after a thorough inspection were found free from rice, bean and grain pests and all shipments were allowed to be delivered.

## PESTS INTERCEPTED.

Nineteen packages of fruit and seven packages of vegetables, also six packages of plants, were taken from the baggage of passengers and immigrants from foreign countries and destroyed by burning. The plants were destroyed under the rules of the Federal Horticultural Board on account of not having the required permits of entry. A package of beans from Spain was found infested with the common bean weevil and was fumigated before delivery. A package of algaroba beans from Manila was infested with the larvæ of some weevil, and was fumigated before delivery. A juniper plant was taken from its container and all soil removed and after replanting same in sterilized soil was allowed to pass. One package of hibiscus cuttings from the Philippines was intercepted at the postoffice and was returned to the shipper as unmailable under the rules of the Federal Horticultural Board.

## BENEFICIAL INSECTS.

Owing to Mr. D. T. Fullaway's absence during the month of June the work of breeding and distributing parasites of the fruit fly and horn fly was carried on by the assistant in the insectary. Mr. Fullaway kindly assisted in a general way as adviser, and the following parasites were reared and distributed during the month:

Bred—*Tetrastichus*, 24,510; *F. fullawayi*, 1,123; *D. tryoni*, 644; *African spalangia*, 4,000; 30,277. Other species, 5,000. Total bred, 35,277.

Liberated—*Tetrastichus*, 24,300; *D. fullawayi*, 1,162; *D. tryoni*, 646; *African spalangia*, 2,000; *Opius humilis*, 200; *Philippine spalangia*, 2,500; *Philippine pteromalid*, 1,100; *Hornfly, African*, 1,200; total liberated, 33,108.

In producing these parasites there were used a total of 44,200 pupae.

## HILO INSPECTION.

Owing to the usual leave granted Brother M. Newell at this season of the year I sent Mr. D. B. Kuhns to Hilo to supervise the work there during Brother Newell's absence. Ten steamers arrived at the port of Hilo of which five brought vegetable matter consisting of 184 lots and 2904 packages. The T. K. K. steamer Keiyo Maru arrived direct from Japan with 3000 bags of rice and 346 bags of beans, all of which was passed as free from pests.

## INTER-ISLAND INSPECTION.

During the month of June 64 steamers plying between Honolulu and the ports of the other Islands were attended to. The following shipments were passed: Plants, 108 packages; taro, 458 bags; vegetables, 57 packages; fruits, 3 packages; total inspected, 626.

The following packages were refused shipment on account of infestation or of having soil attached to the plants: Plants, 15 packages; fruit, 18 packages; total refused, 23 packages.

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

## DIVISION OF FORESTRY.

Honolulu, July 13, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit the following routine report for the Division of Forestry for the month of June, 1915:

## MOLOKAI TRIP.

During the first week of June I was on Molokai finishing up the work of which I wrote in my May routine report.

## FENCE WIRE.

On June 7, bids for furnishing 520 coils of No. 6 gauge American Special extra heavy coated galvanized fence wire were opened, and were as follows:

Theo. H. Davies & Co., Ltd.....	\$3.52 per coil.
Fred L. Waldron, Ltd.....	3.74    “
Inter-Island Steam Nav. Co., Ltd.....	3.75    “

The lowest bid was accepted and contract and bond calling for delivery of 150 coils by June 24 and the balance by August 10, 1915, and involving a total payment of \$1830.40, to come out of the appropriation for the period ending June 30, 1915, were executed and approved.

## GRASS CUTTING.

An application to cut grass in the reserve on Tantalus was refused on the same grounds that similar requests in the past were not granted—the objection of residents of Tantalus to the damage done to the roads by the grass wagons and the need of the grass for fire protection.

## USE OF LAND.

An application was received for the use of about 40 acres of land in a kipuka within the South Kona reserve, Hawaii. In a special report on this application I have recommended that it be not granted on the grounds that it would be inconsistent with our forest reserve policy.

## MANUSCRIPT FOR BULLETIN.

Consulting Botanist Joseph F. Rock has revised and submitted his manuscript on “The Forests of the Hawaiian Islands,” being a description of the forest covering of each of the eight principal

islands. As soon as possible I plan to go over this carefully and recommend to the Board as to its publication as a bulletin of this Division.

During the last half of the month, to my regret, I was obliged to be absent from the office on account of ill health.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry.

#### REPORT OF FOREST NURSERYMAN.

Honolulu, July 14, 1915.

C. S. Judd, Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of June:

#### NURSERY.

##### *Distribution of Plants.*

	In seed boxes.	In boxes trans- planted.	Pot grown.	Total.
Sold . . . . .	.....	150	236	386
Gratis . . . . .	3000	1800	1082	5882
	<hr/> 3000	<hr/> 1950	<hr/> 1318	<hr/> 6268

#### GOVERNMENT REALIZATIONS.

##### *Collections.*

Collections on account of plants sold amounted to . . . . .	\$ 7.45
Rent of building, Nursery grounds . . . . .	35.00
	<hr/> \$42.45

#### PRESERVATION FOREST RESERVES.

Rent of premises at Half-Way House, Tantalus, for April, May and June, 1915 . . . . .	\$30.00
For use of two acres of land, Kalawahine in Pauoa val- ley, for April, May and June . . . . .	5.00
For use of land and gathering ti leaf on Kalawahine, Pauoa valley, for April, May and June . . . . .	12.50
	<hr/> \$47.50

## PLANTATION COMPANIES AND OTHER CORPORATIONS.

Under this heading 9000 trees in seed boxes and 300 in transplant boxes, have been distributed during the month. An order for 50,000 seedlings has been received from one plantation. These will be delivered within the next six weeks.

## MAIKIKI STATION.

The work at this station has been principally routine; namely, mixing and sterilizing soil, transplanting and potting plants, etc.

## HONOLULU WATERSHED PLANTING.

During the month 864 kukui trees were planted out. Other work done consisted of hoeing and clearing away grass and weeds from the young trees recently planted.

Very respectfully,

DAVID HAUGHS,  
Forest Nurseryman.

---

DIVISION OF HYDROGRAPHY.

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Honolulu, July 9, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography during June, 1915, is submitted:

## WEATHER CONDITIONS.

With the exception of the Hilo district on Hawaii and the Ewa district of Oahu, the rainfall was only slightly below normal throughout the islands. Both Hilo on Hawaii and Ewa on Oahu districts have suffered from drought, while practically all of Maui and Kauai have had abundant light showers throughout the month. Waianae on Oahu suffered from drought during the early part of the month, but this was broken the last of the month. Heavy rains fell on East Maui and over the most of Hawaii during the week ending June 26.

The rainfall of the upper Nuuanu valley has kept Reservoirs No. 1, 2 and 3 full, and No. 4 has held its own with a depth of about thirty feet.

## LEGAL WORK.

The Superintendent assisted the Attorney-General's office during the entire month by collecting, computing and segregating hydrometric and level data relative to the Waikoloa water case being tried at Kamuela, Waimea, Hawaii.

## SCHOFIELD BARRACKS WATER SUPPLY.

In compliance with a request from the commanding officer, Hawaiian Department, U. S. Army, a report with recommendations relative to the present and future water supply of Schofield Barracks was completed and has been forwarded. .

## KAUAI.

A large amount of small repair and maintenance work was completed; old staff gages were replaced by new enameled gage faces; and a new measurement station was established on the Kaholalele ditch which diverts water from the North Wailua river, just above Kaholalele falls.. This ditch now loses about half its flow by seepage in the first half mile.

Sixty-two stream and ditch measurements were made, and five rainfall stations were visited.

## OAHU.

A large amount of maintenance work was done and all stations on the island were visited. Thirty-one stream and ditch measurements were made, and four rainfall stations were visited.

The discharge from the north portal of the Waiahole tunnel was measured and found to total twenty-four million gallons per day—a decrease of about four million gallons in about a month.

## MAUI.

All continuous record, or clock register stations, were visited and twenty-two stream measurements were made. Two rainfall measurement stations were visited.

## HAWAII

Eight stream and ditch measurements were made on the Waikoloa stream and the Lyons ditch; a large amount of ditch levels were run; and a large amount of hydraulic computing work was completed for the Attorney-General's department, at Waimea.

## JULY PLANS.

*Kauai*.—Most of the month will be spent in collecting and preparing Kauai stream and ditch discharge and rainfall data for the fiscal year ending June 30, 1915.

Three Gurley water stage registers have been ordered for installation, probably in August and September, on the three main branches of the Waimea river. The registers, when established, will furnish records of the entire flow of the upper Waimea drainage at points above all ditch intakes. A ditch measurement station will be re-established on the Kekaha ditch during the month of July.

*Oahu*.—Only routine field and maintenance work will be done, as the entire force on the island will be occupied in preparing data for the report of the past fiscal year. A field trip to all windward Oahu stations will be made, and such low water measurements will be made as are needed to bring rating curves up to date.

*Maui*.—Only routine work will be done. All private ditch discharge and rainfall records for the past year which are available will be collected.

*Hawaii*.—No operations on this island are planned.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

---

FOREST EXHIBIT FOR CALIFORNIA.

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Part of the government's exhibit for the Panama-California Exposition at San Diego left Washington recently. This portion has to do with the national forests of New Mexico, and will be shown in the New Mexico building, the exhibit having been prepared in coöperation with the state board of exposition commissioners of that state. The material also shows specimens of the principal timber trees of New Mexico and their uses.

Other exposition material was to leave soon for San Francisco, where it will form a part of the Panama-Pacific Exposition. Part of this is being prepared through coöperation between the forest service and the United States civil service commission. The commission passes on the qualifications of all candidates for positions in the forest service, testing the fitness of those who wish to become forest officers through outdoor examinations in riding, surveying, timber estimating, and similar matters, as well as by more conventional methods. Its exhibit will illustrate the duties of these officers.

Coöperation also exists, in the preparation of exhibit material, between the forest service and the bureau of education. This shows how forest subjects are used in the public schools, in con-



nection with nature study, commercial geography, agriculture, and the like. One of the exhibits is a display made by the normal school pupils of the District of Columbia, in which a number of those who are studying for teachers' positions entered a prize contest on tree study. Each of the contestants prepared a separate exhibit showing the life history and the products of individual trees, such as white pine, hickory, or sugar maple.

### POTATO SPRAYING.

Following are the conclusions of bulletin No. 397 of the New York agricultural experiment station, Geneva, N. Y., on "Lime-sulphur vs. Bordeaux Mixture as a Spray for Potatoes," the author being M. T. Munn:

"The results of the past two seasons' work are entirely confirmatory of the experiments of the previous two seasons. The relative efficiency of the two sprays, as far as their effect upon potato foliage and tuber yield is concerned, can be definitely stated. Bordeaux mixture, because of its beneficial influence upon the leaves, materially lengthens the productive life of the potato plants resulting in a marked increase in yield of tubers. The lime-sulphur solution, because of its injurious effect in dwarfing the plants and aggravating tip-burn, causes the plants to die ten days to two weeks earlier than those in unsprayed rows and materially decreases the yield of tubers.

"The effect of lime-sulphur on late blight and rot (*Phytophthora infestans*) is still uncertain, since it appeared in the experimental field in but one of four seasons' tests at which time it apparently failed to check the disease.

"It seems certain, then, that lime-sulphur should not be used as a potato spray, while on the other hand it pays to spray potatoes every season with bordeaux mixture, because the bordeaux mixture prevents tip-burn, prolongs the life of the plants, and increases the yield in dry seasons, while in wet seasons the protection against late blight, with its resulting tuber rot, may result in marked gains. Potato growers should not omit the spraying of potatoes with bordeaux mixture."

### AN AMERICAN SUGAR-PLUM.

\$200,000,000 was the size of this sugar-plum in 1909, according to reliable statistics, says Harry R. Lewis, author of "Productive Poultry Husbandry," published by J. B. Lippincott Company. All that tidy sum for what? Just for hen's eggs. (The sale of chickens not included.) It was divided up among a good many Americans, yet the bulk of it went to people living in Iowa, Missouri, Illinois, Ohio, New York, Indiana, Pennsylvania, Kansas, Michigan and Texas. It certainly must have gone a good way toward meeting the high cost of living for them. A good



many other Americans would have been glad to share in that plum—and by the way, why don't they? Read Professor Lewis for the "how to do it." He is poultry husbandryman in the New Jersey agricultural experiment station, and knows all there is to know about it.

---

*"I KNOW A BANK WHEREON THE WILD THYME  
GROWS."*

---

There is a woman who so loved the flower descriptions in Shakespeare's plays and poems that she devoted a sunny garden space to all the dear, fragrant blossoms celebrated in his immortal verse. Lovely indeed was that garden, and redolent of poesy as well as flower scents. Yet who shall say that our own fair land, with its wild cyclamens, Mariposa lilies, wild forget-me-nots, scarlet sage, and hundreds of other rare blossoms, could not outvie all the blossoms that Shakespeare knew? Those who walk abroad under the happy guidance of George Lincoln Walton's "Flower Finder," (Lippincott) need no Latin and less Greek to identify every flower that blooms by stream, hillside or wayside, and find in their friendly recognition all the tender charm expressed in Shakespeare's poetry.

---

*SWEET POTATO AND COWPEA VINES AS FEED FOR  
STOCK.*

---

Some investigations have been made in Japan, and reported on in the Journal of the Department of Agriculture of Victoria, which seem to show that the dried vine of the sweet potato affords an excellent fodder for live-stock. In discussing the work it is said that the aggregate weight of stem and leaves per hectare is 13 tons. The green vine is considered rather a watery food resembling in composition the leaves of the sugar beet, containing tannin, however, instead of oxalic acid. Although this green stuff may with caution be fed as such, it is the dried material which has proved more satisfactory. In the experiments, the stems and leaves were exposed to the sun for a few days, but at a temperature much lower than occurs in the tropics, and eventually an air-dried herb was obtained with a fine aroma, which was gladly eaten by stock. The green vines and leaves of the sweet potato were also shown to serve as useful material for the manufacture of ensilage. Animals fed on this material thrived satisfactorily. Although it is observed that there was a loss in nutritive material during its manufacture into ensilage, this amounted only to about 6 per cent.

In another publication (Tropical Life for April 1915) attention is given to the value of cowpea vine as a cattle feed. After referring to the great value of this material as a nitrogenous fertilizer and weed destroyer, it is stated that cows getting cow-

pea hay averaged 1.3 pounds more milk daily than those which were fed on wheat bran. For pig raising it is said that cowpea vines are invaluable. Experiments made in New Zealand with three 50 pound pigs in a field pasture of cowpeas, given corn additional, and the second lot of three fed on corn only, in a trial lasting forty-two days, showed that the pigs in the cowpea field gained nearly three times as much as those fed on corn alone. In a trial made with this fodder on horses, it was proved that cowpea hay combined with corn and cob meal made a very satisfactory work ration. Cowpea hay with a reasonable quantity of corn is regarded as a good substitute for bran and oats.—Agricultural News.

### *WORLD CHAMPION AYRSHIRE.*

Henderson's Dairy Gem 35175, bred by Hill Top Farm, Wheeling, W. Va., owned by Henderson's Dairy Farm, Hudson, O., has completed her year's test for advanced registry with the official record as a senior two-year-old of 17,974 lbs. of milk, 738.32 lbs. of fat, 4.11% fat, making her the senior Ayrshire two-year-old champion of the world.

This record is an interesting study in breeding for a purpose, whether it was done by accident or design, I cannot say, but it illustrates what we have always claimed, that when Ayrshires that had proved themselves producers were coupled we might expect phenomenal records. The sire of this heifer is Rena's Champion, a young bull with two advanced registry daughters already to his credit; his sire is Finlayston with 39 advanced registry daughters to his credit. The dam of Rena's Champion is Rena Ross with an official record of 15,072 lbs. of milk, 462.86 lbs. of fat, 4.26% fat. The dam of Henderson's Dairy Gem is Dairy Gem, with a three-year-old record of 14,425 lbs. of milk, 533.55 lbs. of fat, 3.7% fat. She was sired by Howie's Dairy King, with 20 daughters to his credit, out of Drummond's Gem, with an official record of 10,841 lbs. of milk 388.60 fat, 3.58% fat.

The above illustrates the value of advanced registry work with any breed of dairy cattle, and should be an incentive to Ayrshire breeders to breed by method not by chance.

C. M. WINSLOW,

Secretary Ayrshire Breeders' Association.  
Brandon, Vermont.

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The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

**G. K. LARRISON,**  
**Superintendent of Hydrography.**

VOL. XII.

SEPTEMBER, 1915

No. 9

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AND  
**Agriculturist**

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OF

Forestry, Entomology and Agriculture

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OF THE

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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugis, Forest Nurseryman, Box 207, Honolulu, Hawaii.

C. S. JUDD,  
Superintendent of Forestry.

---

### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the -- also specimens of the injury. In a tin with a hole or two, or a wax box specimens may be mailed by parcels post. When specimens not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications to  
**SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.**

EDW. M. EHRHORN  
Superintendent of Entom.



# THE HAWAIIAN FORESTER AGRICULTURIST

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No. 9

## FOREST FIRE PREVENTION.

From the federal forest service branch at Portland, Ore., comes the following condensed information and advice regarding the mischief of forest fires and the means of preventing them:

Forest fires are unnecessary, are nearly always the result of carelessness, and may wipe out in an hour what nature has taken years to create.

They destroy existing forests.

They destroy young growth, which means future forests.

They destroy the beauty of the region.

They destroy a great market for labor.

They destroy prosperity.

They destroy homes.

They destroy lives.

Forest fires can be prevented by:

Never leaving a camp fire until it is out;

Never making a camp fire in leaves, rotten wood or against a log;

Never tossing away burning matches or tobacco;

Never burning brush, grass or slashings during a dry season.

## NOTES FROM CALIFORNIA.

Some interesting items, in view of the activities of our Board of Agriculture, appear in a late issue of the Clovis Tribune, of Fresno county, Cal. We note that, in a test of dairy cows, "it is reported that Laton herds are affected with tuberculosis to the extent of 30 per cent." Another item gives, as one of several reasons for a tremendous fall in the demand for milch cows, "the inauguration of the new sanitary law requiring examination is to health, etc." Then comes the following bad news about hog cholera:

"The much dreaded hog cholera is spreading at an alarming rate in the county. Over 100 hogs died in one herd, last week, and were burned, and the sale of pork has fallen off over half in consequence, as the disease is communicable to man and is almost always fatal. It is hard to detect it in a herd until the disease has been firmly intrenched and it is hard to eradicate."

There are different items presaging material advances in the prices of hay and other stock feed the coming winter, which ought to strengthen the Hawaiian campaign for home-grown products of this kind.

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Hawaii has been favored, the past month, with a brief visit from Dr. L. O. Howard, chief of the bureau of entomology, U. S. department of agriculture, Washington, D. C. After looking over the work of the Hawaii agricultural experiment station, he spoke hopefully to a pressman regarding the results to be expected from the investigations, conducted there for the past two years, into the life and habits of the fruit fly and the pink cotton-boll worm. Dr. Howard expressed great satisfaction with the manner in which the division of entomology, of the territorial board, is being conducted. Besides the federal experiment station, he visited that of the sugar planters. Shortly before leaving for Washington he said he was filled with enthusiasm at the beauties of the islands and their agricultural possibilities, and predicted that Hawaii would attract by the tens of thousands middle-aged people looking for an ideal winter resort. Agricultural problems here were being handled in a very efficient way, the noted entomologist remarked, adding, "The board of agriculture and forestry is doing the most intelligent work possible."

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"The Loquat," a semi-tropical fruit "that has not shown itself particular as to soil conditions" in California, is the subject of Bulletin No. 250 of the University of California (Berkeley) publications. It appears to be a fairly exhaustive brochure and may be commended to the attention of Hawaiian small farmers and homesteaders.

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Mr. Hannestad's letter in this number, on the success attending eucalyptus tree growing on Maui, is interesting and instructive.

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The India Rubber World gives estimates to show that the rubber production of 1915 will be about the same as that of last year, which was in round numbers 121,000 tons. Referring to Brazil as "the unknown factor," the World says: "Notwithstanding an extraordinary fluctuating market, South America during the past eight years has been a wonderfully uniform producer. Neither the high prices of the boom period nor the subsequent slump seems to have had much influence upon the outturn of Brazil."

Executive Officer Judd has an official notice in this number relating to brush fires on the Tantalus ridge, Honolulu watershed forest reserve.

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Rule VIII of rules and regulations of the Board of Commissioners of Agriculture and Forestry, being for the purpose of preventing the further spread of hog cholera within the Territory, is promulgated in this number under the signed approval of Governor Pinkham. It prohibits the introduction of hog cholera virus excepting with the written permission of the Board.

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### DIVISION OF ANIMAL INDUSTRY.

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Honolulu, August 16, 1915.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I beg to report on the work of the Division of Animal Industry for the month of July, 1915, as follows:

#### HOG CHOLERA.

In regard to the continued prevalence of hog cholera in the city and county of Honolulu I have to state that diligent inquiry at most of the piggeries in and around the city has shown that the disease is causing but very slight losses, and those principally among young pigs. Further, that it is very doubtful whether these losses are due to actual hog cholera infection and not to faulty feeding and lack of sanitation. In the Kapahulu district, for instance, small pigs are lost from time to time in certain piggeries where the serum treatment is used regularly, while none are lost or even affected in neighboring piggeries where no treatment or preventive measures outside of cleanliness are resorted to. These observations have confirmed my belief that rational sanitary measures and knowledge of feeds and feeding are required far more than serum and virus to make hog raising the success it ought to be here. That the preventive treatment is of great value cannot be questioned, and its use in piggeries where swill is fed may prove profitable, even where hog cholera is known to be present, the serum treatment, so to speak, taking the place of cleanliness and sanitation; but it is an expensive and uncertain way of guarding against disease, and it certainly will not save any of the young pigs that are now being lost on account of faulty care and feeding of the brood sows.

On the two large hog ranches where the disease prevailed during May and June the serum treatment appears to have done everything that could have been expected from it, and no losses have occurred among the several hundred young hogs imported from Oregon last month, and which were serum treated and

exposed to the infection which undoubtedly still lingered on Mr. Pond's place.

On July 27 the Governor approved Rule VIII of this division, which forbids the introduction of hog cholera virus without special permission from this board. While this measure might have seemed superfluous so long as the federal Bureau of Animal Industry had already forbidden the shipment of the virus in interstate trade, it was nevertheless deemed advisable to follow the lead of numerous other states and territories where similar regulations have been promulgated. The principal effect of this rule would therefore be to prevent a resident of or a visitor to this Territory from bringing the virus with him when returning to or arriving in Hawaii from the mainland, whereas it is held the federal regulation applies only to its unauthorized introduction by a public carrier.

#### BOVINE TUBERCULOSIS CONTROL WORK.

The testing of the dairy cattle of Honolulu for tuberculosis was resumed during the last week of July and, as was expected, some very high percentages were met with in those dairies where no testing had been done for sixteen months or more. On the other hand, it was very gratifying to find a number of dairies absolutely free from the disease, while several of those which have submitted their herds to regular tests have only a single animal affected. It is, however, too early to draw any conclusions as to the ultimate result, except to say that the percentage of reactors most likely will exceed that of last year. On the other hand, the results are encouraging in so far as they show conclusively that the milk producer who actually desires to get rid of the disease can do so, and can with very little care maintain his herd clean—at least so long as his neighbors do the same.

It is, of course, to be regretted that the indemnification bill which was introduced before the last legislature, at the instigation of this board, failed of passage, but as nobody is to blame except the dairymen themselves, it is only to be hoped that this just measure will meet with better understanding and support in 1917. In the meantime the coöperation which has now been established with the municipal sanitary authorities cannot fail to be of benefit to the dairy industry, and will undoubtedly have telling effect upon the wholesomeness of the local milk supply. The moral and monetary support of the Board of Supervisors and the reappointment of Mr. Joseph Richards as dairy live stock inspector have convinced the milk producers and dealers of the earnestness of the public in the demand for clean milk from healthy cows; and while the ultimate end—that is, the complete eradication of bovine tuberculosis—unquestionably received a setback of perhaps a year through the opposition engendered during the last legislative session, the cost of the setback, it is

hoped, will prove an incentive to those responsible for it, not to let it occur again. The disease could and should have been stamped out with the end of this year, whereas it will now require two or maybe three more tests before the last case is located and disposed of. This applies, of course, only to this island and to the herds that are not already clean or nearly so.

#### IMPORTATION OF DOGS.

Another attempt at landing a dog from a steamer coming from San Francisco, without submitting it to inspection and quarantine, occurred in July. The dog was carried ashore in a basket, but was quickly apprehended and before it had been in contact with other dogs. As the explanation furnished by the ship's officers seemed reasonable—the dog being brought ashore while the inspecting officer was in the purser's office and the guard at the gangplank having seen him go on board took the inspection and permit to land for granted—no further action was taken in the matter.

In regard to the length of the quarantine period it is worthy of mention that England, since November, 1914, has reduced the period from six months to four, the same as has been in effect here for the past four or five years, and which seems to be sufficient for safety. A slight increase in the number of dogs arriving has been noted of late.

#### VETERINARY MEETING IN OAKLAND, CAL.

On August 17 the writer will, as authorized by this board, leave by the S. S. Manoa for San Francisco in order to attend the annual meeting of the American Veterinary Medical Association which convenes at Hotel Oakland, in Oakland, California, on August 30. At the meeting the live stock sanitarians and veterinary officers from nearly all the states in the Union will discuss such subjects as hog cholera, bovine tuberculosis, foot and mouth disease, rabies and many others.

An invitation has been extended by Governor Pinkham to the Secretary of Agriculture, the Hon. D. F. Houston, to have the chief of the Bureau of Animal Industry, Dr. A. D. Melvin, pay a visit to this Territory on completion of the meeting in Oakland. The Governor's letter, a copy of which is appended, is self-explanatory and went forward on August 10.

The writer will present a synopsis of the work done in this Territory, for the past ten years, and especially with regard to the control or suppression of bovine tuberculosis, and will endeavor to gather all possible information in regard to the latest and most approved methods of dealing with hog cholera and other infectious animal diseases.

In case Dr. Melvin should decide to return with me to Hono-

lulu, it is expected that we will arrive here by the Matsonia on September 14.

Very respectfully,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

THE GOVERNOR'S LETTER.

Executive Chamber, Honolulu, Hawaii,  
August 10, 1915.

Hon. D. F. Houston, Secretary of Agriculture, Washington,  
D. C.

DEAR SIR: On behalf of the Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii I have the honor herewith to request that the Chief of your Bureau of Animal Industry, Dr. A. D. Melvin, be delegated to visit this Territory in the near future in order to secure for that board expert advice and information in regard to the present status of our live stock industry with a view to its further development.

While this Territory must be said to be remarkably free from infectious and contagious diseases of live stock—neither anthrax, Texas fever, rabies, blackleg nor glanders existing here, and bovine tuberculosis, with which work the said board has now remain problems which an uninfluenced mind might solve more readily than one constantly impressed by local conditions. Among these problems might be mentioned the control and eradication of bovine tuberculosis, with which work the said board has now been engaged for more than five years, the results showing a reduction of bovine tuberculosis on the Island of Oahu from nearly 30 per cent to a fraction more than 2 per cent, while the local Board of Health records show a corresponding decrease in cases of tuberculosis in children under five years of age. An aggregate of about 1300 head of tuberculosis cattle have been destroyed, the owners receiving no compensation except that resulting from an increase in price of the market milk.

This system, which appears extremely simple, is based on the public demand for clean milk from healthy cows only, and is unsupported by stringent laws, rules and regulations, or by any appropriation beyond the usual salaries of the same number of territorial and municipal officers as were employed before the eradication of bovine tuberculosis was decided upon. It is fully believed that this system can be carried through successfully in any state, county or community where the local veterinarians, whether sanitary officials or private practitioners, can secure the support and cooperation of the local board of health, the municipal or county sanitary officials and the medical fraternity or association. This work has been in direct charge of Dr. V. A. Norgaard, who for many years was connected with your Bureau

of Animal Industry. Dr. Norgaard has been delegated to attend the American Veterinary Medical Association's meeting in Oakland, California, August 30 to September 3, this year, where he will read a paper on this subject, and where he hopes to meet and interest Dr. Melvin in the extension of this system to other parts of the United States.

Another problem confronting us here is the question as to the advisability of allowing the use of the serum-simultaneous treatment for hog cholera within the Territory.

Two of the largest hog raisers here have come to the conclusion that the serum alone treatment is not satisfactory and claim to have suffered heavy losses for want of permission to introduce and use the virus here. A regulation recently promulgated by the Board of Agriculture and Forestry forbids the introduction of hog cholera virus without special permission, and the question, whether such permission would be to the best interests of everybody concerned, in an isolated territory where the introduction of fresh infection from abroad can be most effectively controlled, and where the disease has always shown a strong tendency to attenuation in virulence, is one which has also actuated the said board to send Dr. Norgaard to the Oakland meeting, for elucidation. His main object will, however, be to meet Dr. Melvin, whom he confidently expects will be there, and in case you, Mr. Secretary, should decide to send him on a tour of inspection to this Territory, to accompany him and assist him in every way possible to make this trip as pleasant and as profitable to all concerned as possible.

Another matter which at any time may become of paramount interest is the food supply of the Territory, which, as you are aware, falls far short of what is required without constant importations, not alone of flour and cereals, but likewise of most meat food products and practically all dairy products.

The question of supporting 200,000 inhabitants besides at present 9600 and prospectively 15,000 or more officers and soldiers for any lengthy period, in case of total or partial isolation, would therefore seem to be one that merits consideration, and one for which Dr. Melvin might possibly be able to suggest measures, at least in so far as the live stock industry is concerned.

It is therefore earnestly desired that this Territory be allowed the benefit of Dr. Melvin's long experience and that you, Mr. Secretary, will authorize him to spend a couple of weeks with us immediately after the adjournment of the Oakland veterinary meeting.

Very respectfully,

LUCIUS E. PINKHAM,  
Governor of Hawaii.

## REPORT OF ASSISTANT VETERINARIAN.

Honolulu, July 31, 1915.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry.

SIR:—I have the honor to submit the following reports for the months of June and July:

*June.**Tuberculosis Control.*

Work under this head was confined to the testing of 13 head of Holstein cattle brought down from the Parker Ranch by Mr. Isenberg. All passed the test.

*Hog Cholera.*

Ten trips of inspection were made as follows: Four to the Lucas and Bellina ranches at Niu and Kuliouou; five to Pond pig farm beyond Schofield Barracks, and one trip to inspect the Railroad ranch's pigs at Nanakuli. At the last-mentioned place hog cholera has never existed, and the animals were found in a healthy and very lively condition.

The cholera situation on Bellina's and Pond's ranches appears to be much improved, and we may say that these two outbreaks are now under control. While there is still plenty of room for improvement in sanitation, the health of the animals is considerably improved and all loss from cholera seems to be at an end.

*Importations of Live Stock.*

S. S. Lurline, San Francisco: 1 Berkshire boar, College of Hawaii; 23 Holstein cows, 2 horses, C. W. Lucas; 7 horses, U. S. Q. M. Dept.; 20 mules, Schuman Carriage Co.; 7 crates poultry, Barrere Sales Company.

S. S. Wilhelmina, San Francisco: 22 crates poultry; 1 crate rabbits, W. F. X. Company.

S. S. Manoa, San Francisco: 6 Berkshire boars, 3 sows, E. O. Hall & Son; 18 crates poultry.

S. S. Matsonia, San Francisco: 1 dog, H. L. Withers; 2 dogs, H. L. Morris; 2 birds, S. Robinson; 1 parrot, W. D. Adams; 1 crate doves, W. F. X. Co.; 30 crates poultry.

S. S. Makura, Sydney—1 dog, K. Courtney.

S. S. Sierra, San Francisco—36 crates poultry, W. E. Bellina.

S. S. Lurline, San Francisco: 6 crates poultry.



July.

*Tuberculosis Control.*

The following dairies received the tuberculin test:

	T.	P.	C.
M. Nishimoto .....	22	22	0
M. Pacheco .....	10	9	1
A. Shimada .....	15	15	0
T. Gouveira .....	56	55	1
J. Gomes .....	59	59	0
M. T. Brazon .....	27	27	0
J. Alias .....	8	8	0
R. A. Franco .....	18	18	0
Chas. Bellina .....	209	181	28
Frank Andrade .....	127	109	18

From the above list it will be seen that a total of 551 head of cattle have been tested, out of which number 503 have been passed and tagged, and 48 condemned and branded. Of the condemned animals 46 have been purchased by the Wahiawa slaughter-house and are being killed at the rate of three or four a day; one has been slaughtered by a Chinese butcher on the owner's premises, and one is segregated awaiting disposition.

The cow which is now segregated and condemned here on July 29 was purchased by the present owner in Hilo, Hawaii, about six months ago and originally came from the Lyman estate, where it had been condemned by Dr. H. B. Elliot but remained unbranded. It was purchased as a sound animal for \$85 from a party in Hilo who had previously purchased it from the Lyman estate for \$30, knowing it to be a condemned animal but saying nothing about that to the present owner.

*Importations of Live Stock.*

- S. S. Wilhelmina, San Francisco: 29 crates poultry.
- S. S. Manoa, San Francisco: 17 crates poultry.
- S. S. Siberia, San Francisco: 1 dog, Mrs. Jack Spreckels.
- S. S. Arizonan, Seattle: 200 hogs (slaughter), 500 hogs (P. M. Pond), 10 cows (Walter Love), A. L. Macpherson; 9 cows, 1 bull, Waialea Ind. School; 10 horses.
- S. S. Matsonia, San Francisco: 1 dog, Anita Gellenbeck; 33 crates poultry.
- U. S. T. Dix, Seattle: 19 horses, officers' mounts; 1 burro; 1 dog, Lt. Col. Keefer.
- S. S. Lurline, San Francisco: 24 mules; Schuman Carriage

Co. (9 landed here, 15 quarantined on Maui); 10 Berkshire hogs, W. E. Bellina; 1 crate live turtles, Yuen Chong Co.; 15 crates poultry.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

### DIVISION OF ENTOMOLOGY.

Honolulu, August 25, 1915.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I respectfully submit my report of the work performed by the Division of Entomology for the month of July, 1915, as follows:

During the month 58 vessels arrived at the port of Honolulu, of which 20 carried vegetable matter. Of these vessels 12 passed through the Panama Canal.

Disposition.	Lot.	Parcels.
Passed as free from pests.....	1007	19,117
Fumigated .....	3	861
Burned .....	24	24
Total inspected .....	1034	20,002

Of these shipments 19,868 packages arrived as freight, 47 packages as mail matter, and 87 packages as baggage of passengers and immigrants.

#### *Rice and Bean Shipments.*

During the month 38,708 bags of Japanese rice, 400 bags of Chinese rice and 2494 bags of beans arrived from the Orient. After thoroughly inspecting these shipments they were found free from rice, bean and grain pests and were allowed entry.

#### *Pests Intercepted.*

Twenty-one packages of fruit and one package of vegetables were taken from the baggage of passengers and immigrants from foreign countries and destroyed by burning. One lot of coconuts from Manila was treated with fumigation on account of being infested with scale insects (*Aspidiotus destructor*). Also 36 bags of coconuts arriving from Central America were fumigated as a precautionary measure. The soil was removed from a pot plant from Japan in which we found an ants' nest. A package of gladiolus bulbs had to be fumigated before delivery on account of aphid infestation.

*Beneficial Insects.*

On July 1 Mr. D. T. Fullaway again took charge of the Insectary and the following parasites were reared and distributed during the month:

## Bred—

Tetrastichus .....	30,300
Diachasma fullawayi .....	913
Diachasma tryoni .....	554
Total bred .....	31,767

## Liberated—

Tetrastichus .....	28,100
Diachasma fullawayi .....	957
Diachasma tryoni .....	566
Total liberated .....	29,623

Besides the above parasites of the Mediterranean fruit fly, we have also been able to liberate the following parasites for horn, house and stablefly:

African spalangia .....	900
Philippine spalangia .....	900
African hornfly parasite .....	500
Philippine pteromalid .....	500
Total liberated .....	2800

For breeding purposes a total of 31,800 pupae were used and the grand total of liberations of all parasites, including *Opius humilis*, exceeded 32,423.

*Hilo Inspection.*

Brother M. Newell reports the arrival of eight steamers and three sailing vessels at Hilo, of which five steamers brought vegetable matter consisting of 228 lots and 3678 parcels. One crate of wormy turnips was destroyed and all other shipments were found free from pests.

*Inter-Island Inspection.*

During the month of July 63 steamers plying between Honolulu and the ports of the other islands were attended to. The following shipments were passed:

Plants .....	80 packages
Taro .....	403 bags
Fruit .....	39 packages
Vegetables .....	35 packages

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Total inspected .....557

The following packages were refused shipment on account of infestation or of having soil attached to the plant:

Plants .....	17 packages
Fruit .....	20 packages

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Total refused ..... 37 packages

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

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#### DIVISION OF FORESTRY.

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Honolulu, August 12, 1915.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I respectfully submit the following routine report for the Division of Forestry for the month of July, 1915:

#### ANNUAL FISCAL REPORT.

The first two days after my return to the office early in July were spent in writing a report on the work of this division for the fiscal year ended June 30, 1915. This with similar reports from the other divisions has been forwarded to the Governor for use in his annual report to the Secretary of the Interior.

#### APPLICATION FOR DEAD TIMBER.

An application was received from Mr. Edwin C. Moore in behalf of homesteaders in Kula, Maui, to remove and use for fence posts dead mamane trees from the Kula forest reserve. Reference of the application to the local district forester brought back the recommendation that the application be not granted. He informed me that, so far as he knew, similar permission had never been granted in the past, and he believes that to grant it now would lead to complications. Pending the time when I can become personally familiar with the situation, the permission has not been granted.

## FENCING.

During the month it was possible to arrange for the survey of government boundary lines at Aliomanu, on the Moloaa forest reserve, Kauai. This was completed and I am now arranging with Forest Ranger Lovell to go ahead with the construction of the forest fence, which will be approximately three miles long.

## ALGAROBIA INFESTATION.

The attention of this division was called to an infestation of the blossoms of algaroba trees by the receipt from Mr. Chas. H. Merriam of specimens of the infestation which came from near Kamalo, Molokai. This infestation is said to have caused a serious reduction in the volume of the algaroba bean crop in this region in the past and in the size of the beans. The Superintendent of Entomology reports that the damage is done by a small moth, the larva of which is responsible for attacking the blossoms; that it has been known to exist in the islands for some time and is found also on immature grapes on Maui; that it usually appears in dry seasons, and that some natural parasites keep it in check. While there is nothing specific that can be done at present to prevent this pest, it is believed that it will not grow any worse.

## HONOLULU WATERSHED FOREST RESERVE.

The custom of requiring permits to burn brush and other similar material on Tantalus within the Honolulu Watershed forest reserve was continued by the publication during the month of a By Authority notice which extends this requirement through the period ending June 30, 1916. The object of this is to supervise such burning and reduce the fire danger in the planted and natural forest.

One day was spent with the forest nurseryman and two seed boys in thinning out the brush and branches along the road to the Pali so as to open up a view around a dangerous curve to make auto travel safer and in other places to afford a better view of the scenery in Nuuanu Valley. The eucalyptus plantation in this valley, started with federal funds, was also inspected and most of the trees found to be growing well.

## HAWAII TRIP.

On July 28 I left for the Island of Hawaii to investigate several forest matters. The last two days of the month were spent on a trip in the mauka land of Humuula, where a small part of the Hilo forest reserve has been applied for as a homestead, and in the mauka sections of Piha and Laupahoehoe, where cattle

depredations have occurred on government land in the forest reserve. The results of my investigations will be made the subjects of special reports.

Respectfully submitted,

C. S. Judd,  
Superintendent of Forestry.

#### REPORT OF FOREST NURSERYMAN.

Honolulu, August 13, 1915.

C. S. Judd, Esq., Superintendent of Forestry.

DEAR SIR:—I herewith submit a report of the principal work done during the month of July.

Nursery. ....

#### *Distribution of Plants.*

	In Seed Boxes.	In Boxes Transplanted.	Pot Grown.	Total.
Sold .....	....	...	694	694
Gratis .....	1000	941	513	2454
	<hr/> 1000	<hr/> 941	<hr/> 1207	<hr/> 3148

#### *Collections.*

Collections on account of plants sold amounted to.....	\$12.70
Rent of building, Nursery grounds, for June.....	35.00
Total .....	<hr/> \$47.70

#### *Plantation Companies and Other Corporations.*

The trees distributed under this heading amounted to 10,000 in seed boxes and 150 pot grown.

#### *Seed Collecting.*

The collecting of *Crevillea robusta* seed has kept the boys busy for the past three weeks. We have now got over 12 pounds of clean seed of this species. We have searched all the koa groves around Tantalus and Nuuanu Valley for seed, but have succeeded in procuring only a few ounces of good seed.

*Makiki Station.*

The work at this station has been principally routine. We are now getting together a large stock of plants and there will be plenty on hand for everybody when the planting season begins.

*Honolulu Watershed Planting.*

During the month 478 kukui trees were planted out along the ewa side of Herring Valley. Other work done consisted of hoeing and cleaning away grass and weeds from the trees recently planted. The first koa and kukui trees planted on the face of Sugar Loaf hill are making a remarkably fast growth, and it will not be long before they cover the ground completely.

*Advice and Assistance.*

The writer has been called upon to make visits and give advice as follows:

Calls to places in and around the city, 10; advice by telephone, 13; advice by letter, 7; advice given at Nursery, 9. Total, 39.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

EUCALYPTUS RECORD ON MAUI.

Makawao, Maui, August 18, 1915.

Editor The Forester.

Dear Sir:—In regard to a statement by Mr. C. S. Judd in The Forester concerning the yield of ironwood on Kauai, I beg to state that we have a better record in blue gum here at Kailiili—one cord of wood to 3½ trees at an average, eighteen years old grove. Some trees give more than two cords.

In these ten years there have been set out about two and a quarter million (2,250,000) trees in the forests of the Maui Agricultural Company at Kailiili and Opana; but, as the first two years were spent mostly in experimenting, only a few trees being set out, most of the actual planting was done in eight years.

It is a pleasure now to see how fine the native undergrowth is springing up under the close-planted eucalyptus trees, so that the groves already make good water conservers, as well as they will make lumber and fuel in time to come. Of course, where the land has been used a long time for pasture and the Hilo grass has well settled, it will take a good while for the undergrowth to make much headway, but I hope it will come along well eventually.

Next season we expect to have between three and four hundred thousand plants to set out. About 50,000 of these may be sold to the small farmers and homesteaders at \$1.50 a thousand, cost price at this nursery.

Truly yours,

U. HANNESTAD.

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### THE SOW'S EAR.

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(By E. G. CHEYNEY in *North Woods for July*.)

As long ago as Shakespeare's time, it had already become proverbial that "you cannot make a purse out of a sow's ear." The world is supposed to have advanced immeasurably in knowledge and wisdom since then, and yet, in spite of all our study and all our boasted efficiency, there are thousands of people twisting away at the patient old porker's ear in the vain hope of making something beautiful. This is especially true in respect to land. There is a prevalent idea, fostered by some real estate men, demagogues and misguided agricultural enthusiasts, that a paying farm can be made out of any kind of land. But it requires very little imagination to liken a paying farm to a purse, and a glance at history will soon convince any open minded man of the similarity of a portion of this fair country to a sow's ear.

In the old country the largest crops in the world are raised. This is partly due to the intensive methods used, but more largely to the careful selection of the land. Each little patch of land has a reputation for its ability to raise some particular crop. Some of it is recognized as unprofitable or even totally unfit for any crop at all. Even in this country certain classes of land are recognized. We hear of corn land, wheat land, clover land, etc., thus admitting that there are different grades of soil. Why not have the nerve to carry this to its logical conclusion and admit that there is some land which is not fit for any crop? Admit that a certain portion of it is a sow's ear? Admit that it is fit only for a forest?

In the early days in this state it was the ambition of every farmer to raise wheat. Land not in wheat was waste land. Gradually they began to realize that there were crops which would pay better than wheat on some land. As a consequence, the crops became more diversified and the profits larger and more sure. This recognized the principle that land was not fit for the purpose of producing any particular crop, but rather to produce revenue from anything that can be grown. Why, then, not extend this principle a little further and grow trees where they will produce the large return; and they will produce the larger returns on certain lands and under certain conditions.

This is sufficient evidence to show that there is a choice of land and a choice of crops; but little use is ever made of the



knowledge. A man buys a piece of wild land and clears it for a farm without once considering the capital he is investing or the probable returns. He, after he has eked out a miserable existence for years, may begin to realize that the timber he cut away and burned would have made him more money than he will ever make out of his farm. In other words, the farmer is groping blindly in the fog, a fog cast about him by his own hopes and ignorance, by the real estate men handling poor lands, and by the demagogues who are feathering their own nests by promoting a false boom for the country.

The value of other kinds of property is based on the revenue that they will produce. Even the rent of a farm land is figured on a percentage of the value; but the value is a fictitious one selected at random. Land is the only kind of property which is valued independently of its productive capacity—the only true basis of valuation.

Some day this fog will rise. The people will rebel against the tyranny of the land speculators and demand that the land be valued at its true worth. When they do, crop production will take its proper place as a solid business transaction, farm land will produce farm crops, forest land forests, iron lands ore, and there will be no waste land. The economic condition of the country as a whole, and more especially that of the forested portion, will be tremendously improved. The sow's ear will be left where it will at least be of some value to the sow and the farmer will be infinitely better off and happier with the more edible portions of the hog.

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## MUSHROOM CULTURE.

---

A. J. PINN, *Inspector of Agriculture, N. S. W.*

For the successful culture of mushrooms it is essential that the crop be grown either in very rich "made" soil or in a prepared manure bed, and in a temperature that does not exceed 86 degrees Fahr. and does not fall below 50 degrees Fahr. The second condition is obtained by making use of cellars, disused tunnels, old houses, etc.

Having obtained a suitable place, the bed must be prepared, its chief constituent being good horse manure that is fairly free from long straw. Two mediums are employed—(a) a mixture of earth and manure, (b) horse manure with no earth.

Where earth and manure are used, it is quite usual to mix a fourth or fifth part of good soil with manure fresh from the stable. The process of fermentation is then slower, and the heat more constant.

When manure only is used, the bed must be properly prepared, as stable manure ferments quickly and produces a degree of

heat that is unsuitable for the purpose. The method usually employed is to mix the manure thoroughly, so as to make it of even character throughout, place it in square heaps about 3 feet high, and then beat or tread it down well. If it is a little dry it should be moistened somewhat, and then left to ferment until the heat has increased to such an extent that portions of the manure in the center begin to turn white, which usually occurs in about a week. It is then necessary to break the heaps up and remake them as before, care being taken to place the material that has been on the outside of the first heap in the center of the second one, and so on. Within a few days fermentation will again have increased so much that it will be necessary to remake the heaps a second time. In a few days the manure will have become a brown color, and somewhat greasy. It will be found that, in order to obtain the necessary consistency, the heaps must not be of less size than a cubic yard.

When in the required condition, the manure should be made into beds about 2 feet high and with a base of 2 feet, and should have a flat surface, or, if made against a wall, it may slope from the wall to the floor. Beds are sometimes made in old tubs or half-casks. The beds should be firmed, and allowed to remain a few days in that condition before spawning.

The correct time for spawning is when the temperature is about 78 degrees Fahr., and this must be determined by taking the temperature.

The spawn is sold in brick form by leading seedsmen. For some days before spawning, the brick should be kept in a moderately warm, moist place, so as to stimulate the mycelium of the fungus. The bricks are sometimes moistened on each side and spread out between a couple of beds. Before use, the spawn should be broken up into pieces about 6 or 7 inches long, 2 inches wide, and 1 inch thick. Each piece is then inserted lengthwise in the bed and flush with the surface, openings having been made with the hands at distances of about a foot apart each way. Usually in beds 20 to 24 inches there are two rows, the pieces in one row being opposite the spaces in the other. The manure must be carefully pressed round each piece, so that it is covered to a depth of about 1 inch.

If the conditions are satisfactory, the spawn should commence to grow in about seven or eight days. At the end of that time, any pieces that have not commenced to produce white threads connecting with the surrounding manure should be replaced by fresh ones. In a fortnight or three weeks after spawning, the spawn should have spread throughout the bed, and should begin to show itself at the surface. At this stage the pieces of spawn should be withdrawn, or they will become mouldy and soil the mushrooms in their immediate vicinity. The empty openings should be carefully closed by pressing down the surrounding soil

or manure. The top and sides of the bed should then be covered with a layer of about half an inch of light loamy soil, in a fairly moist condition and lightly pressed down. When the surface becomes dry, light waterings should be given.

Within a few weeks of the last operation, the mushrooms should appear, and should continue to yield for two or three months. The watering of the bed is usually done with liquid manure, or water containing some nitrogenous fertilizer, such as nitrate of soda. The temperature of the liquid should be between 70 and 86 degrees Fahr.

Beds made in open places that are exposed to changes of temperature need to be covered with straw.—*N. S. W. Agricultural Gazette.*

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## EXPERIENCES WITH POULTRY.

ARTHUR E. BEST, N. S. W.

I have come to the conclusion that poultry, run in connection with an orchard, is a very good side line, amply paying for itself and leaving a small margin to spare. Besides reaping an egg crop, you have, or should have, from every twenty-five head of fowls 2 cwt. of manure per month, which in twelve months is a considerable help with young trees, seeing that with two-year-old trees about four shovelfuls of manure is a good supply.

In feeding the breeding pen I use half-pint bran, one pint pollard, quarter-pint dried blood and bone, and a little salt for the morning mash. This is mixed neither too dry nor too wet. At midday a liberal supply of green feed is put in, a small patch of kale being grown for the purpose in case the summer should be dry, and there should be no green stuff in the orchard. The evening meal consists of half-pint corn and one pint wheat. Plenty of clean cool water should always be before the fowls. For this I use a kerosene tin cut in halves, placing one half in a case set on its end, with the lid removed and the opening facing south. This keeps the water nice and cool, and prevents dirt and rubbish getting into the water. The hens should have a fair-sized pen so that they will have plenty of exercise, but they must not be overfed or else they will become too fat and the chickens will be weak. Oyster shell and broken crockery or shell grit should always be in the pen. For this I place in the pen a flat box—6 inches x 12 inches—with a piece of 4-inch wire netting over the top. This prevents the hens from scratching it out and wasting it.

When the eggs are collected for hatching they should be placed in a flat box with the small end up, and if you wish to keep them over a week, turn the box over once a day, and keep them in a moderately cool place. I do not think it is advisable

to wash the eggs intended for setting; the dirt should be rubbed off if there is any on them.

After many trials with the hen as a hatcher, and with sad disappointments, I have concluded that the artificial incubator is far the best; there is greater certainty about the chickens, and when they are hatched there is no trouble with vermin. For the room, 6 feet x 4 feet and 5 feet 6 inches high, with a solid ground floor, is the most economical; 22 feet of 3 x 2, 22 6-foot palings, and a roll of 15 feet of some roofing material, will make the required room. To ensure a steady temperature and prevent the walls from attracting the heat of the sun, the following solution is invaluable:—Six parts stone lime, two parts coarse salt, and one part alum. Slack the lime; dissolve the salt and alum in hot water, and add to the lime. When properly made this should have the consistency of paint. Put three coats of this on the walls, allowing a day between each coat of solution. It will last for years, and will not rub or wash off. On one occasion I turned the eggs on Saturday at midday, and did not return until Sunday at 9 p. m.; as I got 35 chicks out of 40 fertile eggs, I think this result speaks well for both machine and room. I may state that I only see my machine once a day, viz.: 8 p. m., when I turn the eggs.

During the first week the food I use consists wholly of rolled oats, but this should not be fed in a way that it will sour. I find that it should be crumbled a bit, and sprinkled over the run for the first two days. After that I place it in a trough specially made of galvanized iron, with bars of wire looped over the top, and soldered on each side. This is also a good idea for the water, as it prevents the chicks from getting into the water and keeps it clean.

My mixture for the chicks is one pint finely cracked maize, half-pint cracked wheat, half-pint linseed meal, half-pint coarse bran, half-pint rolled oats, half-pint sea shell grit, one pint lucerne dust, quarter-pint salt. This has proved very good with my little flock, and twice a week I give them one teaspoonful of Epsom salts to a pint of fresh cold water. A rough shed should be supplied for them also, so that as the chicks get older they can be put there to look a little after themselves. In this I place some stable manure, leaves, short grass, etc., and it is wonderful how the chicks thrive. Especially during the hot sultry weather should this be supplied; they have the shelter, also the ventilation, and room for exercise. I think this very essential for allowing the young chicks to run in.

As soon as I can discern which are cockerels I pen them off, and feed for the morning meal—three parts pollard and one part oilcake; maize at midday, or, if it is available, thick milk instead; then maize again at night. A little green stuff should be supplied for them to pick at during the day.—*N. S. W. Agricultural Gazette.*

## SUNFLOWER-GROWING FOR SEED.

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The sunflower will grow in almost any soil and in any climate. It will bear cold or heat, drought or rain. It is subject to no disease, and to no climatic disqualification. The cultivation is very simple. As stated, the plant is not at all particular, but prefers light, rich, well-drained soil. It is advisable to sow early say, the beginning of September—to secure perfect maturity. The quantity of seed required per acre will vary from 4 to 6 lb. It should be sown in drills, 5 feet between the rows, and the seed drilled or dibbled in at intervals of 3 feet. The plants may afterwards be thinned out, if found necessary owing to exuberant growth, to ensure exposure to the sun—a very necessary condition. As the plants have a habit of spreading their branches and heads in successive layers over each other, thinning is generally necessary. When 12 inches high, a slight earthing up benefits the plants. Sunflowers with many heads do not ripen the seed evenly, therefore it is better to cultivate a species producing only one large head to each plant.

The tall Mammoth Russian is such a variety, and may be planted closer. It produces more seed than any other sort, and can be obtained from most seedsmen in Brisbane, and probably elsewhere.

A yield of 50 bushels per acre is not uncommon under favorable conditions. The Mammoth; or Giant Russian, has often produced flower heads 15 inches in diameter and bearing over 2000 seeds.

The leaves of the sunflower, when sun-dried and pounded, and mixed with meal or bran, make good fodder for milch cows. The oil expressed is almost equal to olive oil.

We are not sure of the wholesale price now ruling for the seed; before the war it was quoted at £12 per ton.—*Queensland Agricultural Journal*.

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## WEEDS AND THE FARMER.

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"It is said that man can get used to anything. He certainly has become used to acknowledge weeds as his master. They are sprawling like a great evil thing over the country, starving and choking to death millions of plants which are useful to us.

The tribute they take is enormous—incalculable. If we said that but for the weeds our crops would be as much again, we should not be guilty of exaggeration. And at a time when every meal produced at home is of special value, we let millions of them be destroyed by our enemy, The Weeds, because of quite a number of reasons.

Not because we do not know what to do—for we do. We

know every detail concerning weeds, their habits of life, their modes of attack, and the best way of attacking and killing them.

But we do not use our knowledge, because it is no one's business in the State to see what we do."—*The Smallholder*.

---

BY AUTHORITY.

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE VIII—DIVISION OF ANIMAL INDUSTRY.

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry concerning the Introduction of Hog Cholera Virus into the Territory of Hawaii.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following rule and regulation for the purpose of preventing the further spread of hog cholera within the Territory:

Section I. Until further notice, the introduction of hog cholera virus into the Territory of Hawaii, by any means whatsoever and in whatever form or mixture and under whatever name or designation such virus may appear, is hereby prohibited, unless written permission is first obtained from this Board.

Section II. This regulation shall take effect upon its approval by the Governor.

Honolulu, Hawaii, July 15, 1915.

(Sgd.) LUCIUS E. PINKHAM,  
Governor of Hawaii.

Approved: July 27, 1915.

---

BRUSH FIRES ON THE TANTALUS RIDGE, HONOLULU WATERSHED FOREST RESERVE.

Notice is hereby given that in accordance with Section 497 of the Revised Laws of Hawaii of 1915, fires to clear land, including the burning of fallows, stumps, logs, brush, dry grass or fallen timber, shall not be started for the period from the date hereof until June 30, 1916, on any land within the boundaries of that portion of the Honolulu Watershed Forest Reserve lying between Pauoa and Manoa Valleys; on that portion of the government land of Kalawahine lying outside the forest reserve; and on that tract known as the "Makiki Lots," unless written permission has first been obtained from the office of the Chief Fire Warden at the Government Nursery, King Street, Honolulu.

(Sgd.) C. S. JUDD,

Superintendent of Forestry and Chief Fire Warden.  
Honolulu, July 17, 1915.

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The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

---

## **DIVISION OF HYDROGRAPHY.**

Rooms 17-22 Kapiolani Bldg. Tel. No. 3662.

The Division of Hydrography has on hand free publications relative to the water resources of the Hawaiian Islands. These publications furnish detailed data as to daily, monthly, mean, maximum, and minimum run-off of streams and ditches, and also cuts and maps pertaining to the different islands. These publications will be mailed free of charge on request.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

**G. K. LARRISON,**  
Superintendent of Hydrography.

VOL. XII.

OCTOBER, 1915

No. 10

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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

C. S. JUDD,  
Superintendent of Forestry.

### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a waxed box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications to SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRHORN,  
Superintendent of Entomology.

# THE HAWAIIAN FORESTER AGRICULTURIST

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## *TWO RECENT BOOKS.*

In reviewing two new works the Philippine Journal of Science offers the following introductory remarks, the author of the article being Prof. C. F. Baker, A.M., an associate editor of the Journal:

"The literature of tropical agriculture has been notably enriched by the appearance of these two new works. The development of tropical agriculture during the past twenty-five years has presented many interesting and noteworthy features. It has differed markedly from the development of temperate-region agriculture, and it has been able to borrow comparatively little from the latter. Many of its crops are entirely peculiar to the tropics, and tropical conditions furnish a series of wholly unique problems. Tropical planters have had to feel their way by painful steps, gradually gaining the local experience necessary for successful, practical operations. Even this kind of development has been far more rapid than in the case of temperate-region agriculture, largely due to the fact that tropical agriculture has been characterized by the investment of large capital. The capital invested gradually drew to its service well-trained technical men from the temperate countries. In late years the establishment in colonial possessions of active agricultural experimental stations has given a great impetus to the development of the technical side of tropical agriculture. Much of the early literature of tropical agriculture consisted of accounts of the personal experiences in tropical planting of untrained men, some of whom, however, in the school of hard experience finally became very successful planters. Until within the last decade really high-grade technical works on tropical agriculture were very few, and even yet works like Semler's *Tropische Agrikultur* and Warburg's *Die Muskatnuss* remain very rare."

More than thirty years ago the late Albert Jaeger, the commissioner of agriculture who started Tantalus forest, remarked to the present editor of the Forester that there was at that time practically no literature of tropical agriculture. According to the Philippine reviewer the lack has been only recently supplied, and that with much yet to be accomplished. Readers of the Forester will recall some contributions from Hawaii to the literature on question which have had wide publicity in official prints and

magazines of tropical agriculture in countries far apart as the poles. The works now noticed by the Philippine magazine quoted are one on "Cocoa" by Dr. C. J. J. van Hall, director of the Institute for Plant Diseases and Cultures, Java, and the other on "The Coconut," by Edwin Bingham Copeland, professor of plant physiology and dean of the College of Agriculture, University of the Philippines. Both are published by Macmillan & Co., Ltd., St. Martin's street, London. "The two books under consideration," the reviewer says, "well represent the college grade of tropical agricultural science. They are exceedingly rich in the application of modern science to the growing of two very important tropical crops. They probably represent the highest development yet attained in the agronomy of any tropical crop." As the coconut appears to be the livelier subject of the two products treated in the books mentioned, so far as Hawaiian industries are concerned, the following excerpt from the review of Dr. Copeland's work is selected for reproduction here:

"Doctor Copeland's book is a splendid example of scholarly and scientific treatment. It is, perhaps, the best case extant in a work on any single major tropical crop of the application of modern biological methods to all the details of the agronomical side of the subject. An innovation in this work, of the highest possible importance, consists of a thorough consideration of the physiology of the coconut tree. There is no doubt that this will prove an epoch-marking event for the agronomy of all crops and of all countries. We would have little respect for a system of medicine, or confidence in its methods, in which there was no provision for thorough technical study of the physiology of the human body, yet the agronomy of most tropical and many temperate crops is exactly in this condition—the details of the life operations of the plants in question, as to their foraging ability, food elaboration, water requirements, transpiration habits, organic reaction to surrounding conditions, and specific reaction to disease, being unknown. The experience of the practical planter is one continuous struggle with serious problems, many of which might easily be solved through fuller knowledge of the detailed physiological operations and needs of the plant he is attempting to grow. It seems that if anything is to be expected from real colleges of agriculture as distinguished from farm schools, and more particularly expected from colleges of agriculture in universities, it is a thorough grounding in these basic lines of work that shall enable students to approach the practical problems of agronomy with broad intelligence and really adequate equipment.

"In this connection Doctor Copeland's book furnishes the best example of what a textbook for a college of tropical agriculture should be. His work is, of course, not final in any respect, and he clearly recognizes, as does Doctor van Hall, that the science of tropical agronomy is an extremely undeveloped one. In the

face of this fact some temperate-region agronomists do not seem to be able to understand why things should not be done thus and so in the tropics—along lines well established in temperate regions. The light will not dawn upon such, or rather the knowledge of the lack of light, until they join the ranks of pioneers in a new tropical country and undertake the practical establishment of well-ordered cacao or coconut plantations. It is evident, for instance, in Doctor Copeland's discussion of fertilizers, that the subject is still an open one, no comprehensive experiments having yet been carried through a sufficiently long term of years. The subject of the seed selection of the coconut still requires thorough investigation and experimentation.

"Doctor Copeland does not mention the interesting case of the small island of Rotumah in the South Seas, which is said to produce coconuts of unusual size and value. These coconuts, in years past, are said to have been used extensively for the establishment of plantations in other islands, some being reputed to have brought as much as a shilling apiece as seed. It would be a matter of the highest interest and importance to trace the results obtained from these seeds in other islands and under other conditions."

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An article in this number from the *Tropical Agriculturist* (Ceylon) on new types of tobacco should be interesting to the pioneers of Hawaii's revived tobacco industry.

---

Both interest and value are added to the article from the *Maui News*, replying to the *Garden Island*, on the homestead question, which is reprinted elsewhere, from the fact that the *Maui* writer (Mr. W. J. Cooper) is himself one of the *Kuiaha* homesteaders.

---

W. T. Cox, in the *North Woods*, organ of the Minnesota Forestry Association, advocates the use of aeroplanes in patrolling forests for the prevention of fires. This is not so wild as it might otherwise appear, because there is a possibility of securing coöperation with a naval aero station in Minnesota. Mr. Cox points out that the lake-dotted area of the northeastern part of the State is peculiarly adapted to patrol by the use of hydro-aeroplanes or flying boats.

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Messrs. Russell and Budden, in discussing the results of the application of various disinfectants to the soil, conclude that none of the well-known antiseptics is as good as steam either in increasing the amount of ammonia in the soil, killing insect and fungoid pests, or in inducing a good soil development.—*Tropical Agriculturist*.

## DIVISION OF HYDROGRAPHY.

Honolulu, August 7, 1915.

## Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—The following report of operations of the Division of Hydrography during the month of July, 1915, is submitted:

## RAINFALL.

The rainfall for July was nearly normal. No heavy storms occurred, but all islands were fairly well supplied with rain in the nature of moderate showers. Streams show discharges above the average for this time of year, and the Nuuanu reservoirs are well filled.

## LEGAL WORK.

A large part of July was spent in computing and furnishing to the Attorney General's office, estimates and data in relation to the Waiakoloa (Waimea, Hawaii) water case. These estimates and data will be used as testimony for the Territory at a later date.

## HONOLULU WATER SUPPLY.

Several days were spent on the collection and preparation of data relative to the future water supply of Honolulu.

## PREPARATION OF ANNUAL AND BIENNIAL REPORTS.

A report of operations covering the biennial period ending June 30, 1915, which will include all data collected during this period, is being prepared. This report will be published by the U. S. Geological Survey at Washington, D. C., and it is expected that about one year will elapse before the report is available. Blueprints of all data to be contained therein, for any especial location, may be received by applying for the same at this office.

## REPORTS.

*Kauai.*

Mr. Hardy spent about half, and Mr. Horner about one-third, of the month collecting and preparing data for the 1915 biennial report. In the field, 34 streams and 17 rain-gaging stations were visited, and 14 stream measurements were made at regular stations.

*Oahu.*

Only routine operation and maintenance work was done. Thirty-six stream and three rain-gaging stations were visited.



Fifteen stream measurements at regular stations and two miscellaneous measurements were made. A large amount of private rainfall and ditch discharge measurements were collected for the 1915 biennial report.

#### AUGUST PLANS.

*Kauai.* In addition to regular routine work, new ditch measurement stations will be established on the Kekaha and Waimea ditches and materials will be hauled and preparations made for the construction of three new stream-gaging stations on the three main branches of the Waimea river above all intakes.

*Oahu and Maui.* Only necessary routine work will be attempted. All employees will be used as much as possible on the preparation of data for the biennial period ending June 30, 1915.

*Hawaii.* The Superintendent of Hydrography will spend the greater part of the month at Waimea, Hawaii, assisting the Attorney General's department in the Waiakoloa water case.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

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#### NEW LIGHT ON POTASH POSSIBILITIES.

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The London Public Ledger, quoting the New York Oil, Paint and Drug Reporter, gives us, under the above heading, the following interesting information concerning America's efforts to make herself independent of Germany's potash supplies, or to need them as little as possible.

The stirring course of muriate of potash, we are told, sales of round quantities having lately been made at \$200, with prospects of further sharp advances, centers unusually keen interest in the latest official report of developing a commercial production of potash in California. Dr. Norton, who is conducting investigations into our potash possibilities for the Government, treats the subject with a thoroughness of detail both from the technical and practical viewpoints. His technical qualifications have been fortified by a valuable practical training acquired during his consular service in Germany.

Dr. Norton speaks most hopefully of the saline deposits at Searles Lake, in San Bernardino County, California, as a potash source, and the company which has undertaken the most capable utilization of the vast visible supply of raw material has expressed its hope of marketing potash salts within a few months. The commercial possibilities of these saline deposits are strengthened by the fact that they contain borax, sodium sulphate and carbonate and common salt, besides being rich in potash.

Much attention is given to the utilization of the enormous

masses of seaweed off the Pacific Coast as a solution of the potash problem, and while engineers who have studied the methods so far employed to develop the kelp industry have expressed doubt as to the possibility of its becoming a serious factor in the production of potash salts, the leading company engaged in the extraction of kelp is credited with confidence in its ability to build up the industry on a substantial commercial basis. Dr. Norton reports assuringly on the factors of cost of production, cost of handling and physical properties as contributing to make dried powdered kelp seemingly the form in which a substantial commercial demand can be most quickly secured and a form which would appeal rapidly to the manufacturers of mixed fertilizers.

The contamination of soda has been the greatest problem in the extraction of potash from kelp, both the dissolution and ordinary crystallization processes being inadequate to overcome on a practical scale the closeness of solubility between potash and soda. Dr. Norton regards the employment of a new method of fractional crystallization as an important step toward the solution of this difficulty and the operation of this process opens a hopeful field for our potash independence. Government experts have estimated that two annual cuttings of the kelp beds off the coast of southwestern California would yield 59,000,000 tons, or the equivalent of 2,300,000 tons of potassium chloride, which, if marketed at current rates, would yield about \$90,000,000, but if the kelp crop were dried and marketed at prevailing prices for both the potash and nitrogen content its value would exceed \$150,000,000.

Dr. Norton's report offers little encouragement for the commercial extraction of potash from the mineral deposits of California, for, while they contain frequently relatively high percentages of potash, they are not sufficiently high to overcome the serious difficulty of remoteness from existing conveniences for transportation, the chief demand for potash as a fertilizer coming from the eastern half of the country and very largely from the Gulf States.—*Tropical Life*.

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#### SIR HORACE PLUNKETT ON COÖPERATION.

[Address at the Congress of Tropical Agriculture.]

We are to deal today with a subject to which perhaps I may attach undue importance, but as we have to deal with it in an hour, that renders it impossible for me to do justice to the subject without doing grievous injustice to those who have prepared papers, and to those who wish to hear them. I recognize that there is one limitation upon our discussions. We are not here to treat of general principles, but rather of their particular application to certain countries, so that I shall devote the very few

remarks I shall make to what you may possibly find of suggestive value in the coöperative movement generally in these islands.

As we all know, the coöperative movement began in England in the "hungry forties," and has extended since all over the world in its various forms. The first thing that I have to say about the coöperative movement in England is that it hardly touched agriculture at all until the beginning of the present century. In Ireland, on the other hand, just a quarter of a century ago, the agricultural coöperative movement was founded to deal with the special circumstances of that country, and there are, I think, a few points in that movement which are worthy of consideration from those who come from tropical countries. Ireland, of course, is a country where, meteorologically speaking, the temperature is low, and I realize that I must remember the warning given to us by the President of the Congress in his opening address that no knowledge of general principles will avail without a knowledge of the conditions of tropical countries. But in Ireland we had to supplement an agrarian revolution, which was about to transfer, and has now about half transferred, the agricultural land of the country from a small class of landlords, largely regarded as aliens, to a numerous class of cultivators, mostly peasant proprietors. The State, by the advance of some £200,000,000 sterling, and large sums given as a free grant, are carrying out this huge transaction, but they are doing nothing, and could do nothing, or could not do much, to make the necessary changes in the social economy of the agricultural classes which would be required in order to enable the new owners of land to prosper, and to fulfil their huge obligation to the State. We laid down, after years of thought and experiment upon the question of a satisfactory rural economy, two main propositions. The first is that if you want to solve the modern problem of rural life—that is, the problem of inducing and enabling people to maintain a decent standard of comfort in a rural existence in these days of world-wide competition—you have to approach the problem from three points of view. You have to look upon agriculture as an industry, as a business, and, what is perhaps more important than all, as a life. You have to bring into industry the teachings of modern science, into business the methods of our modern business, and into life a scheme of social attraction and amenities; certain intellectual advantages which will enable rural life to resist the lure of the city. The first proposition is, then, that you have to deal with the problem on its three sides; and the second, that you must deal with the business of farming, and the chief reform you have to make there is to introduce methods of combination. We live in days when everything has to be done in a large way—to be done to pay—and when the small producer is at the mercy of powerful middle interests, trusts, combines, and so forth; so that the first thing is to get a sound economic basis by teaching the farmers to combine, and the only method of com-

bination which is suitable to farmers, as we all know, is not the joint stock method, but the coöperative movement. I have always felt that the reason that agricultural coöperation lags so far behind—the reason why even in this congress it is not thought necessary to give more than an hour or so out of a week to the discussion of agricultural coöperation—is that in the urbanization of all thought people in these days think the town method is suitable to the country conditions. They are still hankering after the joint stock method, and have not yet learnt that coöperation is the only method suitable to agricultural conditions. Therefore, we say you have to start by teaching coöperation, and that until you have done that you cannot successfully introduce scientific methods into the practice of agriculture, nor until you have got people to come together in the business of their lives, can you get them to come together for higher intellectual and social purposes.

Our formula in Ireland for solving the rural problem has some notoriety now. It is better farming, better business, better living, and we say that you must begin with better business, and that better business is coöperation. Now I say nothing about the Eastern origin of the most typical of the Irish people. I think myself that their addiction to coöperation has a great deal to do with that. But, broadly speaking, the Irish people belong to the associative races rather than to the individualistic, and that is a tremendous advantage, and it is in that respect that I think many of the tropical countries, especially India, might learn a great deal from our work in Ireland, not so perhaps from the successes as from the failures. I myself have had five-and-twenty years of work in that country, and I have learnt far more from my failures than I have from my successes; and I am in a position now, in dealing with people who have the same kind of outlook towards this problem, to suggest to them how to avoid many of the mistakes we have made.

The most important respect of all, I should say, in which coöperation in dealing with the tropics has to be studied is in the precise relations which ought to exist between State assistance and organized voluntary effort. As you go down in the economic and social scale, it becomes more and more necessary to develop self-reliance, but at the same time it is more and more necessary to begin with State assistance without weakening the patient's resistance to the many diseases which attack the principle of self-help.

I have one practical suggestion to offer, and that is that this Congress should recognize that agricultural organization is not an amateur business but a very highly technical business, and that men must be trained for it if they are going to have any success in it. That we have learnt in Ireland; they have learnt it in England; and they have learnt it in Scotland. We have had in these countries, where the whole trend of thought had

gone against coöperative action, to found agricultural organization societies simply and solely for the purpose of teaching people who do not understand coöperation how to organize coöperative associations for every agricultural purpose; and I happen to know that they are coming to this view in the United States and in Canada, and that schemes are on foot for training organizers to start coöperative movements in these countries. I believe that at the Tropical Agricultural College which is about to be founded somewhere in the Empire, in order that teachers qualified to teach scientific principles of agriculture should be able to learn how to apply those principles to tropical conditions, it is highly important that agricultural coöperation should be taught in this college, and that the agricultural organizer, even if he has learnt his business, as he can learn it in these islands, should go there and learn how to organize in the wholly different conditions of the tropical countries.

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### ECONOMIC VALUE OF BIRDS.

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By F. L. WASHBURN, *Minnesota State Entomologist.*

With a total production of approximately \$9,000,000,000 worth of agricultural and forestry products in the United States, which products suffer a loss of about \$800,000,000 every year through the voraciousness of insect pests, it is not to be wondered at that anything which tends to decrease that loss by which our nation is robbed each year, is of special interest. It is the work of the economic entomologists to restore to the agricultural classes as much as possible of this loss, and, by their researches, to place citizens on their guard against insect enemies. They have been reasonably successful in their efforts, as shown by the large appropriations for this work made by federal and state governments. Massachusetts, for example, has used, in the past, \$150,000 annually to combat the gypsy moth, to which must be added approximately \$100,000 spent by private citizens in that State, and \$10,000 contributed by the United States government. New Jersey is on record as spending \$350,000 a year in fighting mosquitoes alone. Losses from the San Jose scale, codling moth, Hessian fly, chinch bugs, and grasshoppers have been materially reduced through the work of our entomologists, who have also lessened by nearly or quite half, the \$100,000,000 loss on stored products, such as mill stuffs, fruit, cotton, woollens, etc., suffered each year in the United States.

In considering the work of entomologists, however, we must not overlook the value of our birds—many of them wrongly suspected of being without any redeeming quality—in keeping in check the hordes of insects and four-footed vermin that prey upon the crops of farmers, gardeners, and orchardists. The amount of insects eaten by birds and brought to their young by parent birds is almost incredible. For example, 76 per cent of

the food of the bluebird is composed of insects and insect-like animals. The house wren has about the same record. Meadow larks consume cutworms, wire worms, crickets, and grasshoppers, as well as other injurious forms of insect life. The chickadee, from its being an all-the-year-round resident, is particularly useful in eating eggs of plant lice, or canker worms, and of tent caterpillars. Four stomachs or crops of chickadees examined, showed, as a result of a single day's feed, 1028 eggs of canker worms, while in one of the stomachs there were 150 eggs of plant lice. With the chickadees in winter, one frequently sees the downy woodpecker, another useful resident, as is also the brown creeper and the nut hatch. Almost all of our woodpeckers are devourers of grubs working on shade trees.

Most of our hawks and owls prey upon rabbits, gophers, and squirrels, field mice, etc. Some of our smaller hawks, notably the sparrow hawk, eat insects. Wrong impressions prevail regarding this group of birds and the farmer's boy has felt justified in shooting every hawk and owl met with, under the impression that he was doing agriculture a good turn thereby. As intimated above, many of our hawks and owls are decidedly useful. Crows also frequently pick up white grubs turned up by the plow, and we have seen both blackbirds and crows in large numbers eating grasshoppers in stubble fields. Of course, there are times when a farmer or poultry raiser or berry raiser is justified in resorting to a gun, but such times should be rare.

The cuckoos, both yellow-billed and black-billed, are fond of hairy caterpillars—the tent caterpillars and fall web worms, for example. The rose-breasted grosbeak is not only a beautiful bird, and fine singer, but a good bug catcher as well. We have observed it eating grasshoppers and potato beetles, and it is known to consume canker worms, army worms, cutworms, and chinch bugs. The gulls flying on our prairies and their close allies, the small and graceful terns, do the farmers a good turn (no pun intended) by catching grasshoppers.

Amongst our game birds, the quail gets most of its grain after the crop is harvested. It pays for it by eating many injurious insects—potato worms, wire worms, cutworms, and others. Over 100 chinch bugs were found in the crop of a quail shot early in the morning. It is almost a pity that this bird is not constantly protected. The same might be said of the ground or mourning dove, which is included in our game birds, and which is a great devourer of weed seeds and takes but little grain.

There are, of course, some bad birds, such as the sharp-shinned hawk, Cooper's hawk, the goshawk, and the yellow-bellied woodpecker, which sucks the sap from our shade and fruit trees; and, let us add, the European or English sparrow. There are also some birds of doubtful utility, but take it all in all, the birds, as a class, deserve our protection and the evident growth of sentiment toward bird conservation as evidenced by the pas-



sage of federal and state laws, the formation of bird clubs, and the increase of literature upon this subject is an encouraging sign—all indicating a growing knowledge of the usefulness of our feathered vertebrates.

Referring once more to individual birds, in 1083 stomachs of the red-winged blackbird examined, weed seed comprised 54.6 per cent of the contents, grain 13.19 per cent, grasshoppers (in August) 17 per cent, caterpillars 20 per cent in March, and beetles 10 per cent. In 138 stomachs of the yellow-headed blackbird, insects comprised 33 per cent of the stomach contents, weed seed 28 per cent, grain 38 per cent. In the case of the crow blackbird, as a result of the examining of 2346 stomachs, it was found that insects comprise 27 per cent of the food. It is to be borne in mind that nestlings of all of these blackbirds are fed upon insects or insect-like animals. In the case of the cedar wax-wing or cherry bird, only nine out of 152 stomachs (40 of which were taken in the cherry season) contained cultivated cherries and their stomachs have been found filled with canker worms.

Inasmuch as birds collect most insects at the time they are feeding their young, and since they get them as near the nest as possible, making many trips each day, it behooves us to encourage the nesting of birds in every possible way upon our farms and near our gardens and orchards and shade trees.

Much remains to be done yet through our teachers to reach the hearts of our school boys, not naturally cruel (unless it be that they pass through that stage of life and outgrow it), but thoughtless, and interest them in the conservation of bird life in order that they may grow up into clean sportsmen, gentlemen in every sense of the word.—*Fins, Feathers and Fur.*

#### CHARCOAL AND SOILS.

GEO. A. RETAN, *Mount Alto Pennsylvania Nursery.*

Every farmer, gardener and nurseryman should be familiar with the results of experiments carried on for a period of three years, which have demonstrated that charcoal can be made of great use in improving the structure and properties of the soil.

It improves the water and air content of the soil, loosens and intensifies the sub-soil, apart from the chemical materials it may carry, and from its uses with manure. These are not theoretical, but practical conclusions drawn from the use of charcoal in one of the largest nurseries in the State of Pennsylvania, under the management of the writer.

Two general classes of material are available for purposes of fertilization. In the first class are commercial fertilizers. In the second class are those indirect fertilizers which do not furnish plant food directly, but by their action upon the soil may so affect it as to make plant food available by setting it free, through

the altering of the physical condition of the soil. The principal fertilizer in this class is lime. Lime is really a stimulant instead of a plant food, and its continued use may be harmful or exhausting to the soil. Air, water and heat are more necessary for plant growth than mineral food. Production depends upon the proper aeration of the soil, the maintenance of a proper water content and through these two, the raising of the temperature of the soil. These conditions add plant food in that they render available the material that is stored away in soil compounds. The control of moisture in the soil lies in the physical state of the soil. If it is loose, porous, small grained, it will raise moisture freely from the sub-soil and hold it where it will be available for the plants and retard evaporation. The soil may be kept in such condition by proper tillage and by the addition of such materials as will effect a loosening and breaking up of the soil particles.

Green manure is valuable and barnyard manure and charcoal, with constant tillage, are among the best known agents. In using barnyard manure the best part of the manure is often lost. A large part of the mineral content is washed out if the pile is exposed and the liquid portions leak out or escape in gases. Many different substances have been tried for the purpose of preventing this loss. One of the very best materials which can be used for this purpose is charcoal. This is true because of its exceptional power of absorption, it possessing the capacity of absorbing many times its own weight in moisture and also because its physical effect upon the soil and the sub-soil has been conclusively demonstrated. Charcoal is already extensively used as a deodorizer or disinfectant, and the fact should not be lost sight of that the ammonia gas, which is quite lost in the manure heap, would be absorbed by the charcoal and made available for plant use.

For many years the attempt to raise coniferous seedlings in this nursery was a comparative failure because of the hard clay soil, which greatly increased the loss from unfavorable moisture and surface conditions. Among the agents tried for the relief of this condition were green manures, fertilizers and charcoal, and of these only the last has proved successful, as may be observed by the size and weight of seedlings developed from clay beds, fertilizer beds or charcoal beds. The seedlings are much larger and heavier and of better color on the charcoal beds than on any other. Some fertilizer beds show good seedling development, but the beds were not as densely covered with little trees as on the charcoal beds, notwithstanding that the charcoal beds were in the worst section of the nursery, while the fertilizer beds which show the best weights were in sections cultivated for a longer period. The charcoal seedlings averaged a weight of 250 grams for a bundle of 100 trees, as against 127 grams for a check bed in the same grade of soil. These trees were two years old. At one year the differences are not so striking, but are strongly marked. One hundred seedlings from a clay bed weighed 22 grams, while



the same number from a charcoal bed weighed 40 grams. These beds contained a relatively large quantity of charcoal, such as could only be used in hotbeds, gardens, or other intensive work. But the same tendency is shown in the use of smaller quantities. Furthermore, the soil conditions are exceptionally bad in this nursery.

From constant observation and experiment, the action of charcoal that makes it so valuable in the nursery seems to be entirely in the improved conditions of moisture and warmth. It might be thought that charcoal would loosen the soil to the extent that it would dry easily if used in large quantities, but the opposite condition occurs. In dry periods the power of the soil to retain water is increased, and in wet seasons the soil drains quickly with a consequent prevention of fungus that always follows a wet season in a coniferous nursery. The clay beds, by reason of their caking habit in dry weather, and poor drainage in wet weather, exerted the opposite effects and the loss was much more marked. In some cases it was complete. Again, charcoal beds are much warmer, because of the darker color imparted to the soil. This is of the greatest importance in the spring, when the ground has a tendency to be cold. Germination is almost entirely dependent on the warmth present and is consequently greatly helped by the darker color of the soil. Since the darker colored soil does not radiate any more rapidly at night, this heating effect is carried forward into the night and lessens the liability of damage from frost. In gardens and hotbeds, this is of considerable importance. This increased heat is of value in another direction. The aeration of the soil depends upon the heating, and it will be greater in the soil which becomes warmer during the day.

Thus we find that the action of charcoal in the soil is exerted along the lines where the most can be accomplished. The physical conditions of the soil are so improved that the air, heat and moisture coming to the crop is regulated in the most advantageous manner, and mechanical analyses of the sub-soil have shown that the charcoal exerts a beneficial action at a considerable depth, twelve to eighteen inches below the surface. The sub-soil beneath charcoal beds is of a better color and better physical structure than soil from the surface of untreated beds. This means an increase in the water-holding power, and a breaking up of unavailable compounds into available plant food.

To the farmer especially, the use of charcoal extends a wide range of advantages. He can add to the value of his manure, can improve the sanitary condition of the barnyard, poultry house, hog pen, etc.; and at the same time improve the physical condition of his land. When used in larger quantities in gardens, nursery beds, and in intensive cultivation, it offers the best physical condition for the growing crop with a decrease of loss from fungal attacks. The action of charcoal is comparatively permanent as compared with the other agents, which are used

for the same purposes. Experiments carried on over three growing seasons have shown no lessening of the effects under the most unfavorable conditions. The agriculturists of the future must look forward to the conservation of the resources of the land. This is accomplished best by proper control of physical conditions with the subsequent fullest utilization of the natural forces of sunshine, air and moisture. Any man who will look forward to such a careful utilization of his land will surely increase his wealth materially.—*North Woods (Minnesota Forestry Association).*

### MANURING COFFEE.

The manure most commonly used for coffee at S. Paulo consists of stable dung, previously limed and mixed with coffee hulls. When these materials are scarce, poudrette and guano are used. It may be assumed that a three-year-old coffee plant requires 3.4 gms. of lime, 1.2 gms. of magnesia, 6.3 of potash, 0.7 of phosphoric acid. The stable manure used contains in 1000 parts by weight 3.3 of lime, 3 of magnesia, 0.2 of potash, 4 of phosphoric acid; the hulls contain per 1000: 3.9 of lime, 1.7 of magnesia, 20.7 of potash and 1.7 of phosphoric acid. The poudrette employed, in default of the preceding manures, contains 6 per cent of nitrogen, 2 per cent of phosphoric acid and 2 per cent of potash; the guano used in the best farms contains 4.5 per cent of nitrogen, 10.5 per cent of phosphoric acid, and 4.5 per cent of potash; their price delivered at Santos is respectively 7s. 6d. and 6s. 6d. per cwt. First of all 16 to 24 cwt. of lime per acre are spread between the rows, then half a shovelful of stable manure and 22 lbs. of macerated coffee hulls to every four plants; in the case of new plantations only the lime is given.

Opinions differ as to the advantage of using artificials for coffee. Nevertheless, the writer has conducted for the last eight years several experiments on chemical manuring in several plantations, in view of the fact that the question of manuring coffee is becoming more urgent on account of the insufficient quantities of stable manure produced, which allow of its being used only once in 10 to 20 years. The following results were obtained in a plantation 50 years old which was completely impoverished. The experiment was begun in 1910; in the manured plot each plant was given 1.2 lbs. of a mixed fertilizer containing 75 gms. of potash, 52 gms. of phosphoric acid and 28 gms. of nitrogen; the unmanured plot was given a single dressing in 1912 of stable manure with coffee hulls.

Yield of 960 coffee plants with and without artificials:

Manured—1912: 97.62 bushels, 10.37 cwt., 9.41 bushels per cwt. 1913: 90.06 bushels, 11.55 cwt., 7.80 bushels per cwt. Total and average, 187.68 bushels, 21.92 cwt., 8.56 bushels per cwt.

Unmanured—1912: 56.38 bushels, 4.72 cwt., 11.94 bushels per cwt. 1913: 59.81 bushels, 6.78 cwt., 8.81 bushels per cwt. Total and average, 116.19 bushels, 11.50 cwt., 10.10 bushels per cwt.

The difference in the bushel-weights of the manured and unmanured coffee should particularly be noticed.—*Monthly Bulletin*.

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AN INTERESTING LETTER CONCERNING OAHU'S  
GEOLOGY.

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The College of Hawaii.  
Honolulu, Hawaii, Sept. 29, 1915.

Editor Hawaiian Forester and Agriculturist.

Dear Sir:—I think that Forester readers will be interested in this hitherto unpublished letter by the late Doctor Sereno E. Bishop concerning geological formations on Oahu. The letter was made available to me through the courtesy of Mr. Merryman, at the U. S. Magnetic Observatory, Ewa.

Very truly yours,

VAUGHAN MACCAUGHEY.  
Honolulu, January 18, 1915.

Mr. S. A. Deal, U. S. Magnetic Observatory, Ewa, Oahu.

Dear Sir:—Your letter is before me asking "for information concerning the coral plain forming the southwestern part of this island."

I cannot claim much knowledge of the science of geology, but many facts peculiar to the structure of the rocks, mountains and shores of these islands have engaged my attention.

I will try to state such information as I possess in respect to "the depth of the coral, its method of formation and elevation, probable age," etc. Also I will state the theory of the subject as it has taken shape in my own mind, very probably not materially differing from that of others.

The island of Oahu is composed of two separate masses of volcanic mountains, the eastern or Konahuanui, or Koolau mountain, slightly encroaching on its older sister, the Waianae mountain, at the southern extremity of which stands your observatory. Both mountains are of great antiquity, evidenced by the enormous erosion or weathering which they have undergone. This slow gnawing away by the rain storms has largely obliterated the original dome-form of these piles of lava-flows whose strata lie exposed in the numerous deep ravines. The only remaining traces of the original dome-surface are the short slopes of the foothills which survive on the west side of the Koolau range, and a very little on the SE. flank of the Waianae mountain. What remains of both mountains are the skeleton ridges and pinnacles.

Waianae, being much the older, has suffered much the greatest change.

Besides that form of change, the whole island, probably from a very early period, has experienced great subsidence of level beneath the ocean. This subsidence has been doubtless more than 1500 feet. The evidence of this is the depth at which coral has been found in artesian borings, coral not being possible of growth at more than perhaps 20 fathoms of depth. Also the vesicular structure of the lava found at all depths reached by the borings proves the original position of those lavas to have been above sea level, since the pressure below that level would have prevented the occluded gases of the magma from expanding.

At an extremely recent period the whole island of Oahu underwent an apparently simultaneous elevation of level, amounting to from 30 to 50 feet, those being the altitudes at which formerly submarine formations are now found in position above sea-level. Among such elevated calcareous formations of greatest altitude are: coral reef on bank of Pauoa stream, a little below School Street bridge in the city; reefs in Waianae near the railway, adjacent to high lava promontories, and at the north end of the island, a number of masses of ancient *sand dunes* which had been submerged and cemented into hard sandstone by marine action, but were later elevated, and now indicate that marine action to a present height of 50 feet.

As to the depth of the coral in your locality, I would suggest an approximate estimate as follows: I find by the latest map of Oahu that Barber's Point lighthouse, near which I believe is the observatory, is about three and a half miles from the nearest point of the base of the mountain where it meets the plain. Also from that base to the nearest peak is but a slightly greater distance. I think it safe to assume that the grade of descent was the same from the same present base of the mountain to the bottom of the coral reef at the Point. The present altitude of that peak, "Manawahua," is given on the map as 2450. It has doubtless suffered much degradation by weathering. It seems, therefore, quite safe to estimate the depth of the coral at Barber's Point at 2500 feet.

As to the method of formation of coral reefs, that is very fully and well treated in many books on the subject. A coral reef seems to be an accumulation of the debris of various corals and shells beaten by the heavy surf to powder, and cemented by the sea-water. A gradual accretion grows up as the land subsides beneath it, forming first a "fringing" reef, and later, if fresh water from the land interferes with marine growth at the shore, forming a "barrier" reef. There being little fresh water from the adjacent mountain, only a fringing reef was formed at Barber's Point, many miles in width and of great solidity.

The formation of such reef on the western shore along Waianae seems to have been prevented by the violence of the westerly

gales, from which was well sheltered the bay between the Waianae and Koolau mountains.

Of the cause of subsidence of volcanic islands, which seem to be very general in their history, I know of no theory except that their weight tends gradually to press down the earth's crust.

How Oahu came later to undergo a slight elevation, seems to me attributable to some influence of a widespread disturbance of equilibrium of land and sea attendant upon the retiring of the ice-cap at the close of the last glacial period. Such disturbance is farther indicated by the brief explosions about the same date of the series of tuff cones along the southern coast of Oahu, including Salt Lake, Diamond Head, Koko crater, and others. Artesian borings establish the fact that Punchbowl was thrown up before the elevation of the reef, and the rain of black sand (volcanic ashes) covering Honolulu after that elevation. Quite certainly Diamond Head came after the reef was elevated.

I should tentatively guess the age of that elevation to have been 12,000 or 15,000 years ago.

Dr. Dall of Washington, observing the shells found in the ancient coral of our reefs, assigned them to the later Tertiary.

I should guess the age of our Koolau range to be much beyond one million years, and Waianae to be 50 per cent older. The coral reef may have begun to accumulate before the lavas ceased to flow, although most of it must be later than the extinction of the volcanic activity.

This sketch of the subject has perhaps unduly extended itself. Thanking you for calling forth the enjoyment experienced in writing it, I remain,

Most sincerely yours,

SERENO E. BISHOP.

---

### *AYRSHIRE CHAMPION.*

---

Lily of Willowmoor, 22269, bred and owned by J. W. Clise, Redmond, Washington, has just finished her fifth consecutive official record for advanced registry, making a cumulative record of 84,991 lbs. of milk, and 3362.35 lbs. of fat with 3.84% fat average for the five years, making her the five-year champion of the breed.

This record is worthy of study, in that it shows to a remarkable degree the staying quality of the Ayrshire cow. Giving an average of 16,991 lbs. of milk and 672.47 lbs. of fat for five years, she now stands in first place as a long term cow.

She is due to freshen October 12, and had she not been bred to calve within the cumulative requirement she would undoubtedly have again led the world's Ayrshire record for a single year, as her record under these conditions is only 426 lbs. of milk less

than the present record of the world's champion Ayrshire for milk and is 37.96 lbs. more fat.

The record is valuable as showing the constitution necessary to give a remarkable milk and butter fat record, with a calf each year for five consecutive years. To give that amount of milk annually and raise a calf each year, a cow must have constitution, which is characteristic of the Ayrshire breed.

C. M. WINSLOW,  
Sec. Ayrshire Breeders' Association.

Brandon, Vermont.

#### *COMPLETE DIETARY OF PLANT DESIRABLE.*

The Gardeners' Chronicle, referring to this subject, says that though we know that plants require certain elements of mineral plant food such as phosphorus, sulphur, potassium, lime, magnesium and iron, we have yet to discover what others are necessary for their healthy development. Recent experiments conducted by M. Maze with all possible precautions indicate that in the case of maize in addition to the above, manganese, zinc, silicon and cerium, as well as boron, aluminum, fluorine and iodine, are also found necessary. Traces of these latter occur in spring water, and when water, purified by repeated distillation, was used, the complete development of the plants failed.

On general grounds, says the paper referred to, we may conclude that what holds good for maize may also be found applicable to other plants as well. It is a matter not merely of scientific interest but (what is more important) of economic importance that the complete dietary of the plant should be established.

#### *TREE CUTTING UP-TO-DATE.*

For some time it has been known that a wire drawn tight and heated by an electric current red hot would cut its way through a thick tree. Mr. Hugo Gautke, a German inventor, has improved this process by causing the wire to become incandescent simply by friction in working its way through a tree. A steel wire one-twenty-fifth of an inch in diameter is used, and it is said that this can be made to traverse a tree twenty inches in diameter in six minutes. The wire is worked to and fro rapidly by an electric motor and becomes so hot by friction that it burns its way quickly through the trunk. The wire will cut through the tree without the use of wedges to keep the cut open, and the cut may be made several feet up the tree, on the ground level, or even below the ground. The electricity may be brought to the forest from a distance by a cable; a gasoline motor of 10-horsepower and a dynamo are all that is required to use this process. It is contended that the great trees, ten feet thick in the forest on the west coast, can thus be felled with ease.

### *FARMERS' INSTITUTES.*

---

Statistics of farmers' institutes in the United States for 1914 are found in U. S. department of agriculture bulletin No. 269, just received. William Weinrich Jr. is secretary and treasurer of the institutes for Hawaii, but as this Territory is noted with "no report," the presumption is that the movement, like many others in this easy-going sub-tropic domain, lacks vitality. For the entire Union, in the year mentioned, 1-day meetings were—general 5554, women 724, young people 241; 2-day meetings—general 1791, women 128; 3-day or more meetings—general 155, women 28; number of institutes—general 7740, women 880, young people 241; total number days institutes—general 9601, 19,431, women 1451, young people 60; total attendance all sessions—general 2,964,769, women 78,237, young people 7145. Funds appropriated—by the States \$382,364.27, by colleges and from other sources \$67,518.37; total cost \$447,897.51, cost per session \$20.43; appropriation for 1915 \$363,550.

Total number of lectures on State forces, 1287; members of agricultural college and experiment station staffs engaged in institute work, 528; days contributed to work by last-mentioned, 7142; State lecturers giving instruction at teachers' institutes 107, at high schools 348, at normal schools 26, at common schools 200. Copies reports of proceedings published, 279,000. Movable schools—number 219, days 1464, registered attendance 112,498; railroad specials—number 34, stops 1141, miles 17,766, number of lecturers 156, attendance 474,906. Independent institutes—number 1643, sessions 1513, attendance 345,509. Round-up institutes—number 21, sessions 362, attendance 85,189. Picnics, fairs, conventions, etc.—number 635, sessions 817, attendance 90,735. Field demonstration meetings—number of experts 185, days of service 40,084. Total attendance, 1,127,803.

### *FAILURE THAT PROMISES SUCCESS.*

---

The Garden Island has the following comments to make concerning failure of the Kuiaha homesteaders to make a living growing pineapples for \$11.25 per ton when it costs about \$15 per ton to raise the fruit:

"Maui is fretting just now over what seem to be indications of the failure of the Kuiaha homesteading project. It appears, from all accounts, that the homesteaders in this once promising area have become discouraged and, while they are not disposing of their lands, are leaving there to seek a livelihood elsewhere.

"Before this case is heralded abroad as another failure of homesteading in this Territory, we would like to see it thoroughly investigated. On Kauai we do not understand why localities so favorable to homesteading as Kuiaha was supposed to be should not have brought success to the settlers there. Kalaheo,



on this island, was never so promising; yet, look at that region today. From one side to the other and from the mountains almost to the sea you find only success and enthusiasm. Wai-pouli and the neighborhood thereabouts is a newer homestead region, but the people there are going about their plans with fair enthusiasm and, under average circumstances, their success is reasonably assured.

"The trouble at Kuiaha may be with the homesteaders themselves and not with the land, nor with the blights, nor the water, nor the market. Practical farmers are essential to success in any homesteading project, and, if Kuiaha has not had those, the secret of the apparent failure of the enterprise is uncovered right there.

"At any rate, the matter should be investigated. The Territory should know just why homesteading is a failure at Kuiaha, while proving all of a success at Kalaheo, for instance."

In the first place Kuiaha has not yet "failed," and to many the belief is daily growing that the future for this most favored district is brighter than ever. And the coming success will be on a much more substantial basis than pineapple culture alone could ever promise. In the second place, the Kauai homesteads are comparatively new. Their hope is based almost solely on pineapples. It is scarcely likely that they are growing them at a profit, either, under prevailing prices, though their owners possibly don't know it yet. But they will when they come to balance up the returns of several crops with what they have spent.

Pineapples will probably always play an important part in the Kuiaha district; but they will not be the sole dependence of the homesteaders. It is extremely doubtful if any one crop proposition on an average-sized homestead lot will ever pay, Kauai's evident belief to the contrary notwithstanding. But things have already been done in the Kuiaha district that apparently solves this problem. There seems little doubt that Kuiaha will make good—if not all the original would-be farmers, at least a part of them, together with the newcomers who will take their places. The fact that Kuiaha got bumped so promptly in the pineapple game is probably a blessing in disguise, not only for the homesteaders themselves, but for the future of diversified agriculture in all Hawaii as well.—*Maui News*.

---

#### NEW TYPES OF TOBACCO.

---

At the meeting of the Committee of Agricultural Experiments at Peradeniya on May 13 and of the Ceylon Agricultural Society at Kandy on May 25, samples of tobacco grown and prepared at the government trial ground, Jaffna, by Mr. Scherffius, the government tobacco expert, were exhibited for the first time. They comprise types of all the five general classes of tobacco, namely—cigarette, pipe, chewing, cigar wrapper and cigar filler,



so far successfully grown in one small plantation; a most exceptional result to have been achieved due, Mr. Scherffius considers, to the particularly suitable soil and climate of the Peninsula. Special interest attaches to them, as leaf of like quality has probably never before been grown in Ceylon. They demonstrate that leaf suitable for the European market can probably be grown in Ceylon and if so they may prove the beginning of a new industry in the island. Mr. Scherffius, who comes from Lexington, Kentucky, the center of the White Burley district, where a hundred million pounds of it are produced annually, has expressed the opinion that the White Burley leaf just produced in Jaffna is equal in texture to and better in color than the average produced in its original home in America. This is all the more significant when it is remembered that it is only in a very limited area in the States that White Burley can be successfully grown. This pipe and chewing type is very easily cured, requiring no artificial heat or fermentation, but it will not stand heavy manuring. We must await reports from England before being able to speak as to flavor. We can perhaps grow tobacco through a range of 4000 feet elevation, so we could probably produce several of the market grades enumerated above.—*Tropical Agriculturist*.

---

### ALKALINITY AND ACIDITY.

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Alkalinity in soils is caused by presence of lime salts, and in a few cases, particularly near streams of alkaline bore water, to soda carbonate. A slight alkalinity is favorable, but too much alkalinity may be detrimental to plant life. For this reason alkaline bore waters are not suitable for irrigation, although quite fit for watering of stock. To some extent alkalinity can be improved by the application of gypsum.

Acidity in soil is caused when little or no lime is present in the soil, to neutralize the acidity formed by decaying vegetable matter and the natural acidity of some weathered rocks. Too high an acidity is detrimental, and can be improved by the application of lime in the form of slaked lime (burnt lime air-slaked.)—*Queensland Agricultural Journal*.

---

BY AUTHORITY.

### PERMITS TO START FIRES REQUIRED.

Notice is hereby given that, in accordance with Section 497 of the Revised Laws of Hawaii of 1915, fires to clear land, including the burning of fallows, stumps, logs, brush, dry grass or fallen timber, shall not be started for the period from the date hereof until November 30, 1915, on any land in North Kohala, Hawaii, from the northern boundary of the land of Kawaihae I to and including the land of Kaaunahu, unless written permission has first been obtained from District Fire Warden S. P. Woods, Mahukona P. O., Hawaii.

The law requires that "such fires shall not be started during a heavy wind or without sufficient help present to control the same, and the fire shall be watched by the person setting the same, or by competent agents of his, until put out."

Honolulu, Hawaii, September 22, 1915.

C. S. JUDD,  
Chief Fire Warden.

---

BY AUTHORITY.

BIDS FOR FOREST FENCING.

Sealed bids marked outside, "Bids for Forest Fencing, Olaa, Hawaii," and addressed to the Superintendent of Forestry, P. O. Box 207, Honolulu, Hawaii, for the construction of a stock-proof fence around Section B of the Olaa Forest Park Reserve, at 29 Miles on the Voleano Road, Puna, Hawaii, will be received up to and including October 20, 1915. Specifications may be obtained on application from the undersigned.

C. S. JUDD,  
Superintendent of Forestry, Board of Agriculture  
and Forestry,  
Honolulu, Hawaii, October 1, 1915.

---

BY AUTHORITY.

SALE OF AWA ROOT.

Sealed bids marked outside, "Bids on Awa Root, Hamakua Pali Forest Reserve," and addressed to the Superintendent of Forestry, P. O. Box 207, Honolulu, Hawaii, will be received up to and including October 16, 1915, for an unestimated amount of awa root on government lands in the Hamakua Pali Forest Reserve, Hawaii. Bids to be based on the dry weight of awa root per pound and to be accompanied with a check for \$25. Deposit to be placed to credit of successful bidder or returned if bid is rejected. For copy of sample agreement and bond address the undersigned.

C. S. JUDD,  
Superintendent of Forestry, Board of Agriculture  
and Forestry.  
Honolulu, Hawaii, October 1, 1915.

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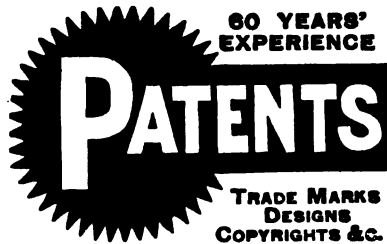
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The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

---

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Rooms 17-22 Kapiolani Bldg. Tel. No. 3662.

The Division of Hydrography has on hand free publications relative to the water resources of the Hawaiian Islands. These publications furnish detailed data as to daily, monthly, mean, maximum, and minimum run-off of streams and ditches, and also cuts and maps pertaining to the different islands. These publications will be mailed free of charge on request.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

**G. K. LARRISON,**  
Superintendent of Hydrography.

VOL. XII.

NOVEMBER, 1915

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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Alizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugens, Forest Nurseryman, Box 207, Honolulu, Hawaii.

C. S. JUDD,  
Superintendent of Forestry.

### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act also specimens of the injury. In a tin with a hole or two, or a wax box specimens may be mailed by parcels post. When specimens not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications to  
**SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 100, HONOLULU, HAWAII.**

EDW. M. EHRHORN  
Superintendent of Entomology



# THE HAWAIIAN FORESTER AGRICULTURIST

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NOVEMBER, 1915.

No. 11

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## *TIMBER PRODUCTION FROM UNREMUNERATIVE LAND.*

---

In Bulletin No. 153 of the U. S. Department of Agriculture, entitled, "Forest Planting in the Eastern United States," the following occurs on page 4:

"As the soil in portions of the hardwood regions deteriorates under cultivation, larger and larger areas will find their best use in the production of timber. In Indiana alone some 6,000,000 acres are at present unproductive."

Through an unfortunate choice of the word "unproductive" and the term "deteriorates under cultivation" this passage is both inaccurate and misleading, since the area of 6,000,000 acres in Indiana referred to is unproductive merely in the sense of not bringing any returns from cultivated crops. Nor is deterioration in the soil making a large area of farm land in Indiana unsuitable for cultivation and adapted only to the production of timber, as the two sentences, taken together, might seem to imply.

Where land is low in value and has proved unremunerative, redirection of the farming methods should first be considered. If reasonably satisfactory returns can not be obtained from general or special farming, live stock production, etc., the advisability of planting the cheaper lands with timber may well be considered.

[The foregoing are the contents of an official leaflet just received.—Ed.]

---

Prof. MacCaughy's papers—one of which, on woody plants of Oahu lowlands, appears in this number—help in bringing the work of the College of Hawaii into broader effectiveness.

---

Mr. Cooke's article in this number, on his system of cattle breeding, is a good example of how important agricultural interests of the Territory may be brought into beneficial discussion.

---

Mr. Judd, the executive officer of the Board of Agriculture and Forestry, has come to the assistance of the editor in a manner that ought greatly to increase the value of this magazine. He has written to the chiefs of divisions requesting them, at convenient intervals, to contribute articles to the Forester upon subjects within their special purview. While there is a great deal

of information useful to agriculturists and stock raisers in the monthly reports of divisions, it is often more casual than direct and is not always in arrangement and form such as to have its due instructional effect.

A statement by Dr. H. L. Lyon, of the sugar planters' experiment station, in the Hawaiian Planters' Record for September last, regarding fertilizers for pineapples has constrained the Pacific Guano and Fertilizer Company to republish, from the Forester and Agriculturist for May, 1911, the concluding installment of Mr. Carlton C. James' serial article on the subject. The article just mentioned gave the results of elaborate experiments in pineapple fertilization, together with positive conclusions thereon, and it was copied and quoted in tropical agricultural magazines all over the world. Naturally, therefore, it was not pleasing to the company whose laboratory expert had produced such a treatise when a contemporary published a declaration that, so far as he had been able to determine, "no reliable data has ever been worked out on which to base the mixing of proper fertilizers for pineapple growing on the various types of Hawaiian soils, or any other soils for that matter."

#### DIVISION OF ANIMAL INDUSTRY.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I have the honor to submit herewith a report of the Division of Animal Industry for the month of August, 1915.

##### TUBERCULOSIS CONTROL.

The following dairy herds received the tuberculin test during the past month:

	Total.	Passed.	Con- demned.
Frank Madeiros .....	20	20	0
P. Miyakawa .....	13	13	0
K. Inouye .....	42	41	1
F. K. Makino .....	5	5	0
K. Onamoto .....	10	10	0
S. Tsudo .....	21	21	0
J. W. McGuire.....	12	11	1
S. I. Shaw .....	41	33	8
Chris Holt .....	15	14	1
Alexander Young .....	41	40	1
M. Reidel .....	9	9	0
K. Oshiro .....	17	16	1
Kamehameha Schools .....	29	29	0

	Total.	Passed.	Condemned.
W. P. Louis.....	12	11	1
Frank Correa .....	13	13	0
S. M. Damon .....	312	305	7
S. Hiarata .....	32	30	2
K. Yamashita .....	34	32	2
M. K. Young .....	42	42	0
M. P. Robinson .....	2	2	0
E. Glade .....	1	1	0
E. M. Taylor .....	4	2	2

From the above tabulated list it will be seen that a total of 727 head of cattle were tested, out of which number 700 were passed and tagged and 27 condemned and branded. Of the 27 condemned cows, 14 have already been slaughtered. The remaining ones are segregated awaiting slaughter.

Two trips of inspection were made to the Wahiawa slaughter-house. This slaughter-house has for some time been buying up cattle condemned at different dairies. Permission was granted to slaughter these condemned animals at Wahiawa provided that such animals be kept in an enclosure sufficiently isolated to prevent all possible spread of infections and that the carcasses received competent inspection before being sold for human consumption.

The abattoir occupies an isolated position, there being no cattle pastured anywhere near it, and, if properly handled, will provide a convenient means of disposing of cattle condemned in the different dairies. At the time of the last inspection some irregularities were noticed which were at once brought to the attention of the manager and have since been rectified.

#### HOG CHOLERA.

Reports of losses from hog cholera have entirely ceased and it is confidently assumed that this last and severest outbreak has been checked. With an intelligent and liberal use of anti-hog cholera serum such losses need never to be experienced again. It is to be hoped that experience gained by the different hog raisers during this outbreak will induce them and all others in the business to report immediately any symptoms among their herds which in any way approach those of hog cholera.

Two official inspections were made at Pond's pig farm, where conditions appear to be greatly improved. All losses which can in any way be attributed to hog cholera have ceased, larger litters are being farrowed, and a greater percentage of the young are being raised, which last is due to more intelligent feeding of the sows at farrowing time and greater care of the young at time of birth.

In consideration of the improved conditions at the farm, permission to ship hogs to the Honolulu market was granted and so far two shipments have been made, one of 20 head to the Hawaii Meat Co. and one of 21 head to C. Y. Hop Co. Both ante-mortem and post-mortem examinations have been made on all of these hogs which have been slaughtered, and not the slightest indications of cholera have been met with in any of the internal organs.

#### IMPORTATIONS OF LIVE STOCK.

Wilhelmina, San Francisco: 35 cases poultry.  
 Manchuria, San Francisco: 1 dog, Wells Fargo Ex. Co.  
 Manoa, San Francisco: 18 cases poultry, 2 cases pigeons.  
 Mongolia, Orient: 5 parrots, F. T. P. Waterhouse; 2 dogs,  
 17 Japanese bantams, Benj. Hegie; 1 honey bear, 2 monkeys,  
 Col. Sam Johnson.

As the point of origin of the above bear and monkeys was Singapore, which has always been considered and included in the tabu district of which the Philippine Islands are a part, the animals were placed in mosquito-proof quarantine awaiting decision from the Federal Bureau of Animal Industry, Washington, regarding a landing permit.

Matsonia, San Francisco: 23 cases poultry.  
 Makura, Vancouver: 1 English bull dog, E. O. White.  
 Lurline, San Francisco: 9 crates poultry; 1 Duroe Jersey boar, Club Stables; 39 mules, Schuman Carriage Co.; 2 Jersey bulls, W. E. Bellina; 1 dog, Capt. Madsey; 14 brood mares, F. F. Baldwin, Kahului.

Wilhelmina, San Francisco: 11 crates poultry.

Respectfully submitted,

L. N. CASE,  
 Assistant Territorial Veterinarian.

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#### DIVISION OF ENTOMOLOGY.

---

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I respectfully submit my report of the work performed by the Division of Entomology for the month of August, 1915, as follows:

During the month 48 vessels arrived at the port of Honolulu, of which 20 carried vegetable matter and one vessel brought moulding sand. Of these vessels 12 passed through the Panama Canal.

Disposal.	Lots.	Parcels.
Passed as free from pests.....	1440	25,172
Fumigated .....	17	96
Burned .....	42	54
Returned .....	6	6
<hr/>		<hr/>
Total inspected .....	1505	25,328

Of these shipments, 25,050 packages arrived as freight, 137 packages as mail matter and 141 packages as baggage of passengers and immigrants.

#### RICE AND BEAN SHIPMENTS.

During the month 43,174 bags of rice and 3201 bags of beans arrived from Japan and Oriental ports which, after a thorough inspection, were found free from rice and bean pests and were passed for entry into the Territory.

#### PESTS INTERCEPTED.

Thirty-one packages of fruit and 9 packages of vegetables were taken from the baggage of passengers and immigrants from foreign countries and destroyed by burning. A passenger from Japan had a box full of land-dwelling hermit crabs, and, as none of such exist in these islands, they were seized and were put in a jar with alcohol as preservative. One package of chestnuts found in Japanese baggage was infested with weevils and was fumigated. Three packages of garden peas came by mail from Japan which were found infested with the pea weevil and were also treated to fumigation. A shipment of orchids arrived from Singapore on August 3. A few of the plants were infested with the striped mealybug (*Pseudococcus virgatus*). In the packing, which was destroyed by burning, was found an ants' nest (*Tetramorium guineense*), a corabid beetle, a cockroach, a dermested beetle and a few spiders and millipeds. Another shipment of plants from Singapore was infested with mealy bugs and scale insects and in the packing was a leaf-eating beetle and some ants (*Prenolepis species*). A shipment of palms from Singapore was free from pests, but in the soil we found an ants' nest (*Tetramorium guineense*). A case containing samples of various hard woods from the same locality was fumigated as a precautionary measure. Five lots of seeds and plants from foreign countries were returned as unmailable under ruling of the Federal Horticultural Board of Washington, D. C., as was also an orchid brought from the Philippines by an officer of the transport.

## BENEFICIAL INSECTS.

Mr. Fullaway sailed from Honolulu on July 25 on the S. S. Chiyo Maru for India via Hongkong, in search of a parasite of the melon fly, and the work of breeding and distribution of the various parasites of the fruit fly, horn, house and stable flies is being continued under my supervision. During the month of August the following parasites of fruit fly were reared:

Tetrastichus giffardii .....	28,000
Diachasma fullawayi .....	1,719
Diachasma tryoni .....	795
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Total bred .....	30,514

The following colonies were liberated:

Tetrastichus giffardii .....	26,500
Diachasma fullawayi .....	1,703
Diachasma tryoni .....	711
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Total liberated .....	28,914

In addition to the above the following parasites of the horn, house and stable fly were liberated:

African spalangia .....	2000
Philippine spalangia .....	2000
African horn fly parasite.....	1800
Philippine pteromalid .....	1700
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Total liberated .....	7500

The grand total of all liberations of parasites, including large numbers of *Opius humilis*, exceeded 36,414 individuals.

On my return from California I brought a very large colony of a mealy bug parasite (*Leptomastix histrio*) which was presented to the Board of Agriculture and Forestry by Mr. Harry S. Smith, superintendent of the California State Insectary. From this lot I have been able to liberate in favorable localities 125 individuals, with prospect of liberating many more during the coming month. This parasite originally came from Sicily, Italy, and promises to be efficient in checking the citrus mealy bug and other species. From the material brought I have been able to start seven breeding jars for future rearings. The parasite is very minute, but very active, and is said to complete its life cycle in from 24 to 36 days.

Several lots of inoculated Japanese beetles have been distributed. Much complaint has reached this office of the damage

being done at this time by the Japanese beetle, the prolonged dry spell having no doubt a great bearing on the marked increase of this pest.

#### HILO INSPECTION.

During the month of August Brother Newell reports the arrival of seven steamers and one sailing vessel at the port of Hilo. Five steamers brought vegetable matter, consisting of 213 lots and 3169 packages. Of these shipments 15 boxes of apples were destroyed on account of being badly infested with worms. The T. K. K. steamer Kiyō Maru arrived direct from Japan bringing 4420 bags of rice, 320 bags of beans and 3 bags of sesam seed, all of which was passed as free from pests.

#### INTER-ISLAND INSPECTION.

During the month 63 steamers plying between Honolulu and the other islands were attended to. The following shipments were passed:

Taro .....	487 bags
Plants .....	102 boxes
Fruit .....	32 boxes
Vegetables .....	41 boxes

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Total inspected ..... 662

The following packages were refused shipment on account of infestation or of having soil attached to the plant:

Plants .....	16 packages
Fruit .....	28 packages

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Total refused ..... 44 packages

On August 17 Dr. L. C. Howard, chief of the Bureau of Entomology, Washington, D. C., arrived from the mainland. This was his first visit to Hawaii, and every one of the local entomologists did all possible during his week's stay to show Dr. Howard the work accomplished here which has given Hawaii fame the world over. I am sure that Dr. Howard left these islands favorably impressed with our work and pleased with having paid Hawaii a visit.

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

## DIVISION OF FORESTRY.

Honolulu, Sept. 29, 1915.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I respectfully submit the following routine report for the Division of Forestry for the month of August, 1915:

## HAWAII TRIP.

The first six days of the month were spent on Hawaii finishing up an official investigation of several matters which required attention. One of these was the proposed elimination of a portion of the land of Humuula in the Hilo forest reserve for homesteading purposes. As pointed out in my special report of August 14, which has been approved by the board, the land in my opinion is necessarily a part of the reserve and should not be eliminated.

While investigating Humuula I had a chance to make a partial study of the situation on the government land of Piha, also in the Hilo reserve, which involves the question of whether a partially destroyed forest should be released for stock grazing or protected by fencing and allowed to come back into heavy forest. Since there is much further information in regard to fencing and the present uses of adjacent land which must be obtained in order to decide on a course which will be wisest in the long run, I desire to investigate still further before presenting my final recommendation to the board.

The Olaa forest park reserves, Sections A and B, along the Volcano road were examined and it was ascertained that they were both in need of protection by fencing. Section A includes the last large section of native ohia and tree fern forest along the road at 24 Miles, and about 5.6 miles of fencing are needed to protect it from cattle and other destructive animals. The government surveyor has already been requested to locate and flag the boundaries preparatory to fence construction. Section B is the koa grove at 29 Miles, reserved at the time when the Olaa summer lots were laid out, and is a scenic attraction to tourists. Here a pig-proof fence is necessary to give adequate protection, and a call for bids for the construction of a fence .44 mile long, according to specifications approved by the board, is being advertised. The B. P. Bishop Estate has signified its willingness to co-operate to the extent of paying one-half the cost of the fence along the reserve where, for a distance of 707 feet, the boundary adjoins the estate land of Keauhou.

The last area visited on Hawaii was at Kapapala, where it has been requested to add 270 acres of government land to the Kau forest reserve. Coöperative tree planting is proposed for



this land, and I am at work on a plan which will be presented to the board as soon as completed.

#### PROPOSED FOREST RESERVE AT MOKULEIA.

Two days were spent on the government land back of Moku-leia, Oahu, examining the forested area with a view to the creation of a forest reserve there. This is one of the projects that my predecessor was not able to complete before he left Hawaii. I found an excellent forest somewhat damaged by cattle, which have gone almost everywhere through it. Showers from Kaala pass over the area and with proper protection the forest can be made to serve more efficiently as a conserver of water in this region, where water in the springs is necessary for stock on the foothills and in artesian wells for irrigation on the lowlands near the sea. Mr. W. W. Goodale, manager of the Waialua Agricultural Company, has kindly offered to cooperate in this project by having his surveyor mark out the boundary line between the government land on the north slopes of Kaala and the private lands makai.

#### TREE PLANTING.

Advice was given Mr. A. A. Wilson, the new manager of the Wahiawa Water Company, on tree planting around the Wahiawa reservoir on Oahu, and he has already begun the work by setting out 400 lemon-scented gum trees which he ordered from the government nursery.

The government land of Aiea, in the Ewa forest reserve, Oahu, was visited in company with Mr. W. P. Jarrett, who has applied for and been given permission to clear away the grass and plant trees on the reserve adjacent to his homestead lot. This will be a benefit to both parties, for it will remove the fire menace to the house which Mr. Jarrett is building and the government will have several acres of the reserve planted to native koa and kukui trees without cost.

#### CATTLE HUNTING ON MAUNA KEA.

During the month applications were received from a Russian and a Portuguese to hunt wild cattle on the north side of the Mauna Kea forest reserve. Upon investigation I found that in order to reach this reserve the lands of the Parker Ranch or of the Kukaiau Ranch must be crossed, and that this is objectionable because hunters are careless in closing gates and their dogs harass tame cattle. Moreover, the custom here has been for the neighboring ranchers to hunt in the Mauna Kea reserve for wild cattle, that really belong to them, and I am informed that there are not many wild cattle left in this part of the reserve. Under the circumstances I thought it unwise to grant the applications.

## FOREST FIRES.

During the month a grass fire was reported to have occurred in North Kohala, Hawaii, in which three government pastoral lands below the forest were burned over in addition to some private land. The person responsible for starting the fire was arrested and convicted and required to pay the cost of extinguishing it.

A rather severe forest fire, which burned over several hundred acres, occurred the latter part of the month on the U. S. military reservation at Waianae-uka. It started several days previously and was thought to have been extinguished by regular troops five or six times, but burning in the roots of trees underground it would break out again and, fanned by the strong wind, would speedily run up the slopes covered with dry grass and ferns. On August 31 I visited the fire with the deputy fire warden and found that everything possible was being done by the military to suppress the conflagration. It was finally extinguished by 2500 soldiers from Schofield Barracks who fought it with wet bags with difficulty on the steep mountain slopes.

On August 29 there was a grass fire at Maili, in the same general region, which was soon extinguished by men from the Waialua plantation assisted by federal troops from the reservation.

## SEED COLLECTION.

Attention is called to the fact that all of the seed needed in raising the popular tree seedlings in large quantities at the government nursery is collected locally by our own seed boys. With some kinds of seed this means a great saving of expense. An instance of this is the lemon-scented gum (*Eucalyptus citriodora*), which formerly we had to buy in California for \$2 per ounce. During the month the seed boys cut a tree of this species on Tantalus where it was crowding other trees, and gathered from it one and a half pounds of good seed, worth \$40.

It has been very difficult for some time to obtain good koa seed on account of a weevil which almost universally seems to infest all koa seed pods. As pointed out in the report of the forest nurseryman, through the kindness of Mr. Frank Greenwell we have been able to secure a limited amount of koa seed from Kona which will tide us over for another year.

## ARBOR DAY.

Mention is made here of the approach of Arbor Day, which, as usual, will be celebrated some day in November soon to be announced by the Governor. The nursery on this island and the sub-nurseries on Kauai and Hawaii are preparing for the event by getting ready a large stock of young trees for distribution,

and it is planned to make the day an unusual event this year by the planting of a greater number of trees than ever before.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, Sept. 29, 1915.

Superintendent of Forestry.

DEAR SIR:—I herewith submit a report of the principal work done during the month of August.

*Nursery.*

*Distribution of Plants.*

	In Seed Boxes.	In Boxes Transplanted.	Pot Grown.	Total.
Sold .....	..	725	54	779
Gratis .....	..	300	721	1021
	—	—	—	—
..	..	1025	775	1800

*Collections.*

Collections on account of plants sold amounted to.....	\$ 6.15
Refund on payment to Sakamoto for rent of land in Kona in connection with parasite work.....	45.00
	<hr/>
	\$51.15

*Plantation Companies and Other Corporations.*

Under this heading 30,000 trees in seed boxes were distributed, 25,000 of which were part of an order received about a month ago for 50,000. The balance of this order will be delivered early in September.

*Collection and Distribution of Seed.*

Mr. Frank Greenwell of Kailua, Kona, has presented the division with over two pounds of koa seed. This donation is very acceptable, as we were entirely out of the seed mentioned. We will have enough now to carry us over to the next seeding season.

The two seed boys are kept busy collecting seed of forest and other trees.

We are in receipt of a number of requests from botanic gardens and other institutions for seeds, and we are forwarding samples to all with the understanding that we receive seed in return when desired.

*Makiki Station.*

The work at this station has been principally routine. A large stock is now ready for the planting season as well as for Arbor Day, which takes place about the middle of November.

*Honolulu Watershed Planting.*

During the month 481 kukui trees were planted out in Herring valley. A large number of holes are also ready for koa trees on the higher slopes. Hoeing and clearing away of grass from the trees will have to be done during September.

*Advice and Assistance.*

Under this heading the writer has been called upon to give advice and assistance as follows:

Calls made in and around city, 10; by telephone, 15; at nursery, 8; by letter, 8. Total, 41.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

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DIVISION OF HYDROGRAPHY.

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Honolulu, Sept. 10, 1915.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—The following report of operations of the Division of Hydrography during the month of August, 1915, is submitted:

WEATHER CONDITIONS.

The rainfall was considerably below normal practically all over the Territory, and streams and ditches are showing very little discharges. Kauai seems to have suffered the least, and Hawaii the most. All streams on Oahu are very low and the reservoirs have been drained to a very low level. The deficiency in rainfall has not been so marked in the Nuuanu valley as elsewhere, but the city water supply reservoirs are gradually being depleted. No. 4 Reservoir has but 19 feet of water in it.

## LEGAL WORK.

G. K. Larrison spent nearly all of the month of August at Waimea, Hawaii, assisting the Attorney General's department on the Waikoloa water case being tried at that place.

## KAUAI.

Construction work on the three new stations being established in the Waimea gorge on the three main branches of the Waimea river was started. In addition to this work 32 stream and seven rain-gaging stations were visited, and 14 stream measurements were made.

An examination was made of the Waimea water supply system and recommendations relative to its improvement were made to the health authorities.

## OAHU.

In the absence of G. K. Larrison, R. C. Rice, office engineer, held a conference with His Excellency the Governor of Hawaii, relative to the leasing of government water in the vicinity of Anahola, Kealia, Kapaa and Lihue, on the Island of Kauai. Conferences were also held with His Excellency relative to the proposed expenditure of \$20,000 by a commission appointed by the Mayor of Honolulu to investigate the city's water resources.

A new garage with concrete floor, large enough to hold two automobiles, oil tanks and other equipment, was constructed on the premises of Judge C. W. Ashford, 1087 Beretania street, under an agreement that no rental is to be paid previous to July 1, 1917.

A large amount of minor repair and maintenance work was done on the stream, ditch and rainfall gaging stations on this island. Twenty-four stream and ditch and four rainfall-gaging stations were visited, and eleven stream and ditch measurements were made.

## MAUI.

Thirty-eight stream and ditch and three rainfall-measurement stations were visited, and 16 stream measurements were made. In addition to this a considerable amount of small repair and maintenance work was done.

## HAWAII.

Seven stream measurements were made on the Waikoloa stream, and a large amount of survey and level work was done—all in connection with the Waikoloa water case.

## SEPTEMBER PLANS.

Kauai—Work will be continued on the construction of the three new Waimea stream-gaging stations. A special investigation and report to His Excellency the Governor relative to the government waters of the Anahola, Kapaa and Wailua streams will be made.

Oahu—The construction of new concrete controls on the two main branches of the Malaekahana, the Kahawainui, Wailele and Eoloa streams, on windward Oahu, will be started. Most of the expense incident to this work will be borne by the Kahuku and Laie plantation companies.

Maui—Sites of the proposed new stations on the Olowalu, Ukumehame and Lahainaluna streams will be selected, and routine maintenance and operation work done.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

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*HOG CHOLERA MAXIMS.*

(Weekly News Letter of U. S. Department of Agriculture.)

Hog cholera is most prevalent at this season of the year, and the department offers the following suggestions to those who are interested in combating the disease:

TO KEEP HOG CHOLERA OUT OF THE HERD.

1. Locate your hog lots and pastures away from streams and public highways, and do not allow the hogs to run free range.
2. Do not visit your neighbor or allow him to visit you, if either of you have hog cholera on your premises.
3. Do not drive into hog lots when returning from market or after driving on public highways.
4. Do not use hog lots for yarding wagons and farm implements.
5. Do not place newly-purchased stock, stock secured or loaned for breeding purposes, or stock exhibited at county fairs with your herd. Keep such stock quarantined at least two weeks, and use care to prevent carrying infection from these to other pens in feeding and attending stock.
6. Burn to ashes or cover with quicklime and bury under four feet of earth all dead animals and the viscera removed from animals at butchering time. They attract the attention of buzzards, dogs, etc., which are liable to carry hog cholera infection.
7. Confine your dogs and do not keep pigeons unless you confine them.

## IF HOG CHOLERA APPEARS IN YOUR HERD.

Treat your hogs immediately with anti-hog-cholera serum, after which they should be kept on a light diet and pure drinking water and confined to limited quarters that may be cleaned daily and sprayed three times a week with 1 part of compound cresol solution to 30 parts of water until the disease has abated in the herd. To obtain the best results the serum must be administered before the disease has progressed in the herd.

## TO RID THE PREMISES OF INFECTION.

Remove all manure and saturate with quicklime.

Burn all litter, rubbish, and old hog troughs.

After the premises are thoroughly cleaned, spray walls, floors, and other surfaces with disinfectant (1 part compound cresol solution to 30 parts water). Where hog houses are small, turn them over, exposing interior to sunlight.

Wallow holes and cesspools should be filled in, drained, or fenced off.

All runs underneath buildings should be cleaned and disinfected and then boarded up.

Destroy hogs that do not fully recover, as they may be carriers of cholera infection.

*EQUINE STOCK STILL LARGE.*

Much apprehension has been felt over the depletion of horse stock in the United States due to the export of horses and mules to Europe and Canada for war purposes. The following figures show, however, that this fear is not well founded:

Number of horses and mules inspected by U. S. Bureau of Animal Industry for export to Europe and Canada from August, 1914, to June, 1915—all months:

	Horses.	Mules.	Both.
To Europe .....	260,791	61,441	322,232
To Canada .....	41,260	24,120	65,380
	<u>302,051</u>	<u>85,561</u>	<u>387,612</u>

This total of 387,612 is less than one per cent of the total number of horses and mules in the United States. As a matter of fact, in spite of this exportation to Europe, the total number of these animals in the United States today is greater than it was a year ago, due to an increased production.

SOME COMMON WOODY PLANTS OF THE OAHU  
LOWLANDS.

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Editor Hawaiian Forester and Agriculturist.

SIR:—In connection with the College of Hawaii course in dendrology, which I give, I have found the accompanying reference list of much service. This is an alphabetical list, cross-referenced, of the commoner indigenous and cultivated trees, shrubs and woody plants that are to be found on the Oahu lowlands. It does not include species that are found only along the beaches, nor does it include many of the rarer horticultural trees. The list aims to cover only such trees and shrubs as one would be likely to find, for example, along a country roadway, outside of the city. The botanical names are those that have found general usage in the technical literature.

Very truly yours,

VAUGHAN MACCAUGHEY.

A REFERENCE LIST OF SOME COMMON TREES, SHRUBS AND WOODY  
PLANTS OF THE OAHU LOWLANDS.

(Exclusive of littoral plants.)

- Acacia Farnesiana—*Klu* (naturalized).
- Ahuhu*—*Tehprosia pescatoria*.
- Aleurites moluccana—*Kukui* (native).
- Algaroba—See *prosopis juliflora*.
- Artocarpus incisa—Breadfruit, *Ulu* (Hawaiian).
- Bamboo—See *Bambusa vulgaris*.
- Bambusa vulgaris*—Bamboo, *Ohe* (introduced). There are several kinds.
- Banana—See *Musa*.
- Bestil—See *Thevetia neriifolia*.
- Breadfruit—See *Artocarpus incisa*.
- Cactus, Prickly Pear—See *Opuntia tuna*.
- Calophyllum Inophyllum—*Kamani* (Hawaiian).
- Capsicum frutescens—Chili pepper; red pepper (introduced). There are several varieties.
- Carica papaya—Papaya (introduced).
- Cassava—See *Manihot utilissima*.
- Cassia Gaudichaudii—*He-uhi-uhi* (native).
- Cassia occidentalis (introduced)—There are numerous introduced Cassias.
- Castor-oil Plant—*Ricinus communis*.
- Casuarina equisetifolia—Ironwood (introduced). There are several species.
- Cestrum sp.—Inkberry.



- Citrus aurantium* var. *Sinensis*—Common orange (introduced).  
*Citrus Japonica*—Kum-quat, Chinese orange (introduced).  
*Cocos nucifera*—*Niu*, coconut (Hawaiian).  
*Coffea Arabica*—Coffee (introduced).  
*Cordyline terminalis*—*Ti* or *Ki* (native).  
 Cotton, Hawaiian—See *Gossypium tomentosum*.  
 Date Palm—See *Phoenix dactylifera*.  
*Dracaena aurea*—*Hala-pepe* (native).  
*Erythrina monosperma*—*Wili-wili* (native).  
*Eucalyptus robusta* (introduced). There are numerous species of *Eucalypto*.  
*Eugenia Jambos*—Rose apple (introduced).  
*Ficus Carica*—Fig (introduced).  
*Gossypium tomentosum*—*Mao*, Hawaiian cotton (native).  
 Guava—See *Psidium*.  
*Grevillea robusta*—Silky Oak (introduced).  
*Hala*—See *Pandanus odoratissimus*.  
*Hala-pepe*—See *Dracaena aurea*.  
*He-uhi-uhi*—See *Cassia Gaudichaudii*.  
*Hibiscus Rosa-Sinensis*—Common Hibiscus.  
*Hibiscus tiliaceus*—*Hau* (Hawaiian).  
*Inga dulcis*—Opium tree (introduced).  
 Inkberry—See *Cestrum*.  
 Ironwood—See *Casuarina*.  
*Jambosa malaccensis*—Mountain apple, *Ohia ai* (native).  
*Kamani*—See *Calophyllum inophyllum*.  
*Kiawe*—See *Prosopis juliflora*.  
*Klu*—See *Acacia Farnesiana*.  
*Koa haole*—See *Leucaena glauca*.  
*Kukui*—See *Aleurites moluccana*.  
 Lantana Camara—Lantana (introduced).  
*Lauhala*—See *Pandanus odoratissimus*.  
*Leucaena glauca*—*Koa haole* (introduced).  
*Manihot utilissima*—Manioc. Cassava (introduced).  
*Mao*—See *Gossypium tomentosum*.  
*Mangifera indica*—Mango (introduced).  
 Mango—See *Mangifera indica*.  
*Melia Azedarach*—Pride of India (introduced).  
 Mexican Almond—See *Terminalia catappa*.  
*Milo*—See *Thespesia populnea*.  
 Monkey pod—See *Pithecolobium saman*.  
*Morinda citrifolia*—*Noni* (Hawaiian).  
 Mountain apple—See *Jambosa malaccensis*.  
*Musa Cavendishii*—Chinese Banana (introduced).  
*Musa sapientum*—Banana (some native and some introduced varieties).  
*Nerium Oleander*—Oleander (introduced).  
*Niu*—See *Cocos nucifera*.  
*Ohe*—See *Bambusa vulgaris*.

- Ohia ai*—See *Jambosa malaccensis*.  
*Olea Europaea*—Olive (introduced).  
*Oleander*—See *Nerium Oleander*.  
*Opium tree*—See *Inga dulcis*.  
*Opuntia tuna*—*Panini* (naturalized).  
*Orange*—See Citrus.  
*Pandanus odoratissimus*—*Hala, Lauhala* (Hawaiian).  
*Papaia*—See *Carica papaya*.  
*Pepper*—See *Capsicum*.  
*Phoenix dactylifera*—Date Palm (introduced).  
*Pithecolobium saman*—Monkeypod (introduced).  
*Plum, Chinese or Java*—See *Syzygium Jambolana*.  
*Plumieria acutiloba*—*Plumaria* (introduced).  
*Pride of India*—See *Melia Azedarach*.  
*Prosopis juliflora*—*Algaroba, Kiawe* (introduced).  
*Psidium catteleyanum*—Strawberry Guava (introduced).  
*Psidium guayava*—Common guava (introduced).  
*Psidium pyriferum*—*Waiawi* (introduced).  
*Phyllanthus roseopictus* (introduced).  
*Ricinus communis*—Castor-oil plant (introduced).  
*Rose apple*—See *Eugenia Jambos*.  
*Salix Babylonica*—"Chinese" willow (introduced).  
*Scaevola glabra*—*Ohe-naupaka* (native).  
*Sesbania tomentosa*—*Ohai* (native).  
*Silky Oak*—See *Grevillea robusta*.  
*Spondias dulcis*—*Wi* (introduced).  
*Strawberry guava*—See *Psidium*.  
*Syzygium Jambalana*—Java Plum (introduced).  
*Tehprosia piscatoria*—*Ahuhu* (native).  
*Tamarindus indica*—Tamarind (introduced).  
*Terminalia catappa*—Mexican Almond (introduced).  
*Thespesia populnea*—*Milo* (Hawaiian).  
*Thevetia neriifolia*—*Bestil* (introduced).  
*Ti*—See *Cordyline terminalis*.  
*Ulu*—See *Artocarpus incisa*.  
*Waiawi*—See *Psidium pyriferum*.  
*Wi*—See *Spondias dulcis*.  
*Wili-wili*—See *Erythrina monosperma*.  
*Willow*—See *Salix Babylonica*.

### A SYSTEM OF CATTLE BREEDING.

(By HON. GEORGE P. COOKE, Manager American Sugar Co.'s Cattle Ranch, Molokai.)

The following system of cattle breeding has been evolved for our conditions; but it may be helpful in suggesting to other breeders a method or basis to work on. Our conditions under which we raise cattle may certainly be called dry, though we have a small section below the forest that raises good *paspalum dilli-*

tatum, red-top and Bermuda grass. Originally it was all open range, the cattle getting water from streams, water-holes or brackish springs along the shore. A general mixture of breeds had been used to a limited extent, Angus, Holstein, Devon, Shorthorn and Hereford blood showing in the herd. The basis of the herd, however, was light built, brindled, long-horned Mexican cattle. On taking over this ranch seven years ago we decided that under the conditions the Devon blood showed up best. That is, under the hard conditions the cattle showing the Devon strain of blood were the thriftiest. It was decided to build up the herd with the old Devon breed. We have a herd of over one hundred pure-bred Devons from which we raise our bulls for the general herd.

The range has been cut up into twelve pastures from 20,000 acres to 4000 acres, depending on natural conditions and whether annual grasses or perennial grasses are the principal feed. A system of pipe carries pure mountain water to all the pastures.

We plan to breed 2000 cows. Estimating a fertility of seventy-five per cent this would give us a branding count of 1500 calves (750 males and 750 females). Breeding the heifers to have their calves when three years old and to be in the breeding herd for four years, we will require five hundred heifers a year to go into the breeding herd. The remaining two hundred and fifty are spayed. Steers are marketed at three years old. Old cows culled from the breeding herd, before calving, have to rear their last calf, making them eight years old when ready to go to market. Thus in a year we expect to have for market 750 three-year-old steers, 250 spayed heifers and 500 old cows.

To carry out this system a series of ear-marks was adopted. Males are marked on the left ear and females on the right ear. The tip of the ear is modified to indicate the age.

Our \* mark is this:

In 1909 calves were marked	full ear
" 1910 " " "	end cut off
" 1911 " " "	split
" 1912 " " "	upper corner out
" 1913 " " "	lower corner out
" 1914 " " "	same as 1909
" 1915 " " "	same as 1910

In this way as cattle come through the chute they can be readily separated either by sex or age.

The above is the theory or basis on which we work. In the practice of it judgment must be used, as it may prove more advantageous to throw out a barren three-year-old cow or a poor mother and retain for another year an old cow that is an excep-

\* The author's diagram shows a concave mark in the middle lower edge of the ear lobe. This is the only mark of 1909 ("full ear"). It is repeated in the succeeding classes, with the respective additions described above in words.—Ed.

tionally good mother. We breed on the basis of one bull to every twenty cows for a period of four months.

When the Devon breed is thoroughly established we expect then to cross Shorthorn bulls on to the general herd. We do not believe in using cross-bred or grade bulls, but plan to use only pure bred. It is slow work to improve a mongrel herd with anything but pure-bred bulls, and one cannot get uniformity in his herd except with pure-bred bulls. In a large herd uniformity is most essential, as the cattle cannot be handled individually but in classes, viz., year-old heifers, two-year-old steers, etc.

### *CASSAVA IN BARBADOS.*

Following is an extract from the official report on the Department of Agriculture, Barbados, 1913-14, just received:

"The cultivation of the different varieties of cassava obtained from Montserrat, Trinidad and Panama, together with a number of the varieties grown from seed, was continued again this year. There are twenty-four new seedlings, obtained during the year, under cultivation. The yields during 1913-14, with four exceptions, were not as high as those of the previous year. This is probably due to the drought experienced from November, 1913, on to the time the cassava was reaped in 1914.

"Every year, just before the rainy season is expected, a number of the peasants dig out their cassava roots so as to enable them to have the land ready when the rain comes to plant other crops. As fresh cassava roots do not keep very long after they have been dug they usually have to sell them at a low price, and later on often suffer for want of food before the crops which have taken the place of the cassava mature sufficiently to be reaped.

"As in some of the neighboring islands the peasantry manufacture their cassava roots into farine, cassava meal, cassava starch, cassava cakes and tapioca, a small manufacturing plant consisting of a mill, a press, and a farine pan with the necessary bags for pressing the grated roots, etc., was, with the kind permission of Mr. W. D. Shepherd, put into operation at Union Hall, which is situate in a district where there are probably more peasants growing cassava than in any other. Before the plant was sent to Union Hall, it was operated at Codrington House, where the Superintendent of Agriculture resides, so as to enable some of the members of the staff of the Department of Agriculture to obtain a knowledge of the manufacture of the articles mentioned above. This was done in order that one of them might be able to instruct the peasantry, etc. As manufactured cassava products like farine, cassava cakes, etc., will keep in good condition for some months, those who have availed themselves of the opportunity to work up their cassava roots should have a food supply sufficient to last them until, under normal weather conditions, their crops of Indian corn, sweet potatoes, etc., are available."

*ROSA HUGONIS.*

---

*A New Hardy, Yellow Rose from China.*

---

DAVID FAIRCHILD.

If you see a particularly beautiful picture hanging in a friend's house your first question is, "Who painted it?" yet how few of the people who visit a rose garden and admire the beauties of color and form ever realize that practically all of our cultivated double roses are almost as much the result of man's work as a picture is. These living forms have arisen from the greatest artificial mixing of species which man has been able to bring about by the process of hybridization.

Wild roses from all over the world have entered into their ancestry and made them what they are, so that to a rosarian the history of a rose's ancestry is quite as fascinating as is a family tree to a student of genealogy.

To create a rose which will delight thousands of people must be as keen and wonderful a pleasure as intellectual man can enjoy; long after he has crumbled to dust generations of beautiful women, happy children, old men and young lovers will bury their faces in its petals and forget for the moment all else but its beauty.

Next to this pleasure, perhaps, is the enjoyment that comes from finding a wild rose in some far-off land where it blooms unseen by cultivated eyes, and knowing that it will become the admired and loved garden treasure of a whole great civilized country.

I do not know if Father Hugo Scallan still lives or not, nor whether his life was a happy one, but if he is alive it would surely give him the keenest kind of pleasure to watch the career of a yellow rose which he found in China.

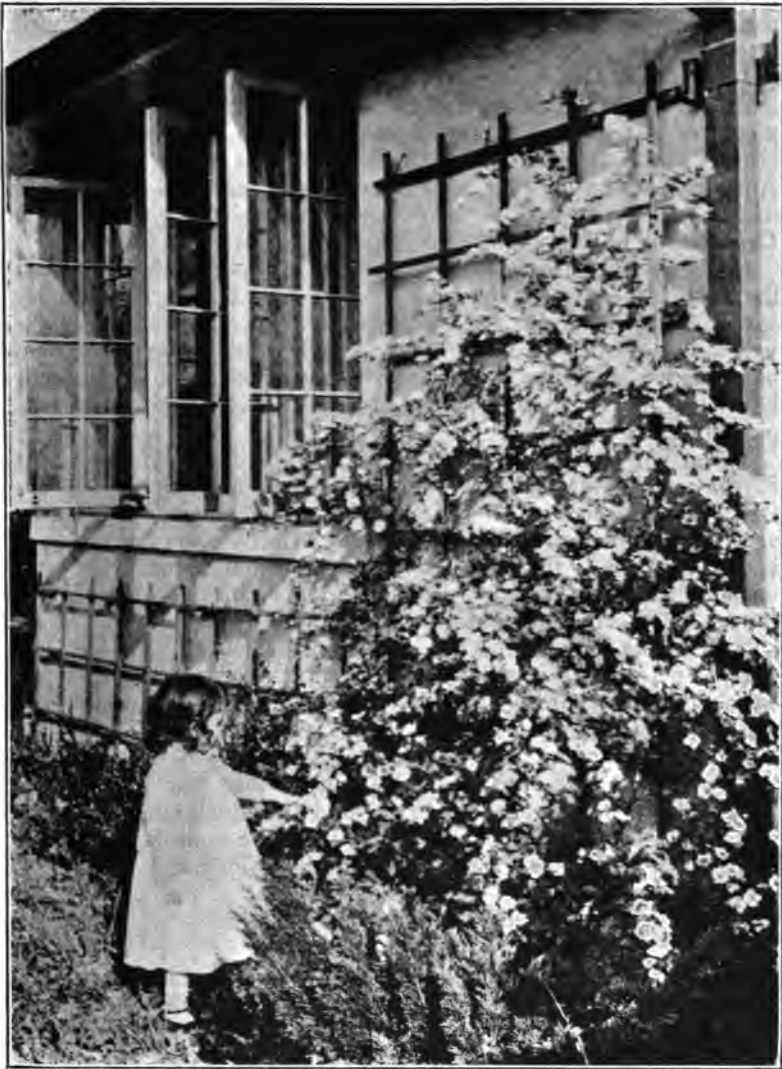
In 1899 he sent seeds of this rose to the British Museum, the authorities there sent it to the Royal Botanic Gardens at Kew—that great institution from which so many things of value have come into cultivation; and from Kew we obtained seeds for the United States. Very early each spring it blooms and it is yearly attracting the attention and arousing the enthusiasm of more and more flower-loving Americans.

*Rosa hugonis* is the name that has been given to this beautiful yellow rose that deserves a place in every dooryard in America. It is the earliest blooming of almost all the roses and earlier than any other yellow rose. It is of a lovely shade of yellow, is delicately perfumed and produces its single flowers in such profusion as almost to conceal the plant. It is perfectly hardy, not being injured by —22 deg. F., which cannot be said of most of the other yellow roses.



**A NEW YELLOW ROSE FOR THE PLANT BREEDER.**

*Rosa hugonis* trained on a wall trellis at In the Woods, North Chevy Chase, Md. One of the earliest of all the roses and earlier than any other yellow rose.



ROSA HUGONIS, FATHER HUGO SCALLAN'S ROSE.

This is not of so deep a shade of yellow as Harrison's yellow or the Persian yellow rose, but the bush seems to be perfectly hardy and it blooms with an abandon quite foreign to either of the others. Photograph of a bush espaliered against the house, In the Woods, North Chevy Chase. Photo by Crandall.

At the Arnold Arboretum near Boston Professor Sargent says it is perfectly hardy and free flowering and "is certainly one of the most valuable single roses which has lately been introduced into gardens."<sup>†</sup>

It seems entirely fitting that to Dr. W. H. Van Fleet, the originator of the Silver Moon and the Van Fleet roses, those masterpieces of rose hybridization, should be given the credit for insisting, as long ago as 1907, that *Rosa hugonis* be introduced into America for the dooryards of American homes and for the use of American rose hybridizers. It was his insistence that led the Department of Agriculture to import it from Kew Gardens.

In the photograph *Rosa hugonis* is shown as espaliered against the wall of the writer's house at North Chevy Chase, Md. Every spring, before anything but the Japanese flowering apricots (*Prunus mume*) and the single flowering Japanese cherries are in blood, it has delighted all who have seen it, but even in winter it is ornamental because of its red-brown stems, red thorns and its picturesque growth.

When not trained against a fall it grows to a height of about 5 feet and its stems are clothed with numerous slender spines which are bright red on the straight young shoots. Its leaves are thin and delicate and so far as the writer's observations go it is not subject to the rose spot disease which turns briar rose bushes, such as Lord and Lady Penzance, into long unsightly masses of naked stems before the summer is over.

This lovely yellow rose has one small drawback. It does not seem to grow easily from cuttings or slips. It seeds freely, however, and can be raised in this way even should a quicker way not be discovered.

To those who are interested in roses it may be a matter of satisfaction to know that the breeding of this rose with others is now going on here in America, and the appearance of some new descendant of Father Hugo Scallan's rose is probably merely a matter of time.—*Journal of Heredity for September, 1915.*

#### GREAT IRRIGATION DAM.

The Arrowrock dam near Boise, Idaho, is practically completed and has been in service during the irrigation season of 1915. This dam provides stored water for use in the irrigation of lands adjacent to Boise, Nampa, Caldwell and other towns within the limits of the Boise Project of the United States Reclamation Service.

The Arrowrock dam is the highest in the world, having a height of 348.5 feet from the lowest point in the foundation to the top of the parapet. It is 1100 feet long on top, contains 585,200 cubic yards of concrete and its crest carries a roadway

<sup>†</sup> Arnold Arboretum, Harvard University Bulletin of Information, New Series, Vol. I, No. 5, p. 20.



16 feet wide. The dam has a gravity section and is built on a curve of 660-foot radius. The spillway consists of a run 400 feet long and a concrete-lined discharge trench approximately 900 feet in length with a capacity of 40,000 second feet. In the run and trench lining are 25,400 cubic yards of concrete, all of which is reinforced.

This spillway run carries a movable crest of unique design which permits the storage of water six feet higher than the fixed crest, but drops automatically, very slowly, in case of flood, so as to give the full capacity of the spillway when needed, and rises automatically again when the flood has passed.

A log conveyor with a capacity of 1,000,000 feet per day permits the passage of logs to the mills below. These logs are hoisted to the top of the dam by a cable lift and taken to the river below the dam through a reinforced concrete chute 650 feet long, the upper 400 feet of which carries a bull chain with spurs or teeth set to hold against sliding. This carries the logs down a 62½% slope and delivers them to a gravity chute through which they pass to the river. It is estimated that there is three billion feet of timber in the Boise Basin above the dam that must be handled in this way.

Preliminary to the construction of the dam it was necessary to construct a standard gauge railroad 17 miles long from Barber Junction on the Oregon Spur Line to Arrowrock. This railroad has been in operation four years, and in that time it has carried 80,000 passengers and about 14,000,000 ton miles of freight. It is the only railroad in the country operated by the federal government, and all tickets carry the signature of President Woodrow Wilson in facsimile.

A 3000-horsepower hydro-electric power plant was built to furnish power for the operation of the construction plant. This has furnished all the electric power needed for construction purposes, and in addition considerable of its surplus output has been sold to local companies. Its total output since May, 1915, has been almost 20,000,000 K. W. hours.

A sawmill was operated for almost two years in the timber about 17 miles above Arrowrock, and this furnished 6,750,000 feet, board measure, of lumber, all of which was used for the building of the construction camp at Arrowrock, and to fill miscellaneous requirements on the work.

The excavation for the dam extended 90 feet below the river bed to the granite foundation, and a diversion tunnel 500 feet long with a cross-section 30x25 feet carried the river around the work until the construction was far enough advanced to start the storage of water.

Regulating outlets in the dam are 20 in number, each being four feet and four inches in diameter. They are controlled by a 58-inch balanced needle valve on the upstream face of the dam. They are arranged in two sets of 10 each, the upper set being

150 feet above the river bed. Five sluicing outlets, each controlled by a 5x5 foot sliding gate, are also provided at river level. All these outlets are operated from control chambers inside the dam.

A system of inspection galleries of which the control chambers are a part give access to the dam at several elevations, the lowest of which is 230 feet below normal high water surface in the reservoir. The capacity of the reservoir is 244,300 acre-feet, or about 79,600,000,000 gallons. This reservoir is 18 miles long and extends up two forks of the river. When needed for irrigation the water is carried down 12 miles in the channel of the river to a low diversion dam and from there taken out over the land through a network of canals and laterals. In this way 234,000 acres of sagebrush desert is to be converted into gardens, orchards and farms.

The principal quantities involved in the construction of Arrow-rock dam and the spillway are as follows: Excavation, 683,000 cubic yards; concrete, 610,600 cubic yards; reinforcing steel, 1,350,000 pounds; gates and structural steel, 1800 tons.

All this work was executed under the general direction of F. E. Weymouth, supervising engineer of the U. S. Reclamation Service, with Charles H. Paul, construction engineer in direct charge, and James Munn, superintendent of construction.

### *A BACTERIAL MANGO DISEASE.*

In the *Annals of Applied Biology* II, pp. 1-14, says "W. N." in the *Agricultural News*, appears an account of a detailed research on a disease of mangoes in South Africa by Ethel M. Doidge, M. A., F. L. S., Mycologist, Division of Botany, Pretoria.

The virulence of the disease is such as to threaten seriously to affect the export trade in mangoes. A large percentage of the fruit falls to the ground whilst yet immature, and the mangoes which remain on the trees are rendered unsightly and unfit for the market. The disease was first reported from Barberton in the Transvaal in 1909 and is said to have appeared there after a hail-storm in 1906, the infection starting in a corner of an orchard and spreading rapidly with the prevailing winds. In 1908 not a single fruit was obtained from sixty trees. Each season since the disease has been steadily gaining ground. No record has been found by the author of any similar affection in other parts of the world.

The damage done is mainly to the fruit. Infection also occurs on leaves and branches, producing lesions in which the bacterium is carried over from one crop to the next. On the leaves small angular water-soaked areas, some 2-3 mm. in diameter, appear, which later become dark brown; the surface is somewhat raised and shining and frequently there is a slight exudation of gum.

Longitudinal cracks are produced in infected petioles. On twigs and branches discolored spots occur which are followed by gumming and the development of deep cracks. By the time the fruit is half-grown the whole inflorescence has frequently become affected, and the death of the stalks causes the fruit to drop. On the fruit itself the first sign of the disease is a small water-soaked area; this spreads considerably, and an irregular discolored spot, intersected with cracks, is eventually produced. The discoloration extends for some distance into the flesh.

All the commonly grown varieties are affected, but in differing degrees. The disease has not been found on related indigenous trees.

Extensive spraying experiments with various mixtures have so far given no evidence of the possibility of control by this means, nor have any other remedial measures proved effectual.

The cause of the disease has been shown to be a rod-shaped bacterium to which the name *Bacillus mangiferae* has been given. It is found in great abundance in the parenchymatous tissues of the discolored areas. It does not affect lignified tissues. The optimum temperature for growth of the organism under laboratory conditions is about 30 C. (86 F.). It grows very slowly at 45 C. (113 F.).

Infection appears to be principally carried from tree to tree by wind, and is distributed about the tree in rain-water dripping from infested leaves.

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### THE POISONOUS NATURE OF CASTOR OIL SEEDS.

---

The following is a summary from the Journal of the Board of Agriculture (England) of a paper on poisoning by the seeds of the castor oil plant read by Kobert at the meeting of the Union of German Experiment Stations at the end of 1913:

"There is only one species of ricinus plant known to botany, viz., *Ricinus communis*, L., but there are a number of varieties. All the varieties tested have proved poisonous, no matter what the size or color of the seeds. The poison is contained in the shelled seeds and not in the shell, capsule, or oil extracted from the kernel. The substance containing the poison is known as ricin; it is not visible as such in the oil-free kernel; in quantity it forms only 1 per cent of the dry, oil-extracted kernels. As, however, ricin exceeds strychnine or arsenic in intensity, small quantities only of ricinus seeds suffice to make a feeding stuff poisonous, a single gram of the kernel mixed with several litres of milk having proved sufficient to poison a calf.

"Castor oil seeds are introduced into feeding stuffs in various ways. In the first place the hedges of fields of ground nut and sesame in the tropics are often of ricinus plants and the seeds may thus get mixed with those of ground nut or sesame at harvest. During transport, in storage, and in unloading there are

again possibilities of castor oil seeds being mixed with other seeds. A further risk is run at the pressing factory where the machines may be badly cleaned after pressing the castor oil seeds, so that these become mixed with the next kind of seeds pressed. Again, for a soap-making process in Germany the use of castor oil seeds is necessary, and there is the chance of their getting into animal foods owing to the amount of transport of these seeds that has to be carried on. Lastly, large quantities of the shells are sold at low prices to manufacturers of compound feeding-cakes who grind and use these shells in the cakes. As no method is known of completely freeing the shell from the kernel, it follows that these cakes must, as a rule, be poisonous, and on an average Kobert estimates that at least 1 per cent of kernel matter will be present with the shell, an amount which is more than sufficient to cause fatal poisoning of cows when it is remembered that cakes are fed at the rate of from  $2\frac{1}{4}$  lbs. up to  $8\frac{3}{4}$  lbs. per head per day. Farmers should refuse all such cakes, and merchants who resort to such practice are as guilty as if they included arsenic in their cakes.

"The poison, ricin, is an albumin and has the characteristic (1) of an albumin, (2) of a ferment or enzyme, (3) of a toxin, (4) of an agglutinin.

"From the albumin nature of the poison it results that the mixture of ricin with human or animal foods cannot be detected by purely chemical methods, even when one hundred times the fatal dose is contained in the foods; but the possibility of extracting the poison from foods by water or other method rests on the albumin nature of the poison.

"The enzyme characteristics of the poison are useless for purposes of detection, since feeding cakes are always found to contain enzymes similar in effect to ricin.

"As regards its toxic effects immunity is reached by small and gradually increasing doses; and in the blood serum of immunized animals 'antiricin,' which has the effect of an antitoxin, is formed. This serum has been found extremely effective in the detection of extremely small quantities of ricin, but there is the drawback with this method that a different serum is produced in the case of some varieties.

"The method of detection by injection into guinea pigs and observing whether symptoms of super-sensitiveness are produced is not recommended by Kobert.

"He lays stress, however, on the efficacy of a third method which rests on the agglutinin characteristics of the poison, i. e., even if diluted to one-millionth part of the original strength it coagulates the blood corpuscles of guinea pigs, and a substance like sealing wax is obtained on filtering. This method holds good for all varieties of ricinus and is even more sensitive than the serum test. Even here it must be remembered that 'phasins' give a similar reaction. Ricin, however, will stand a temperature

of 70 deg. to 75 deg. C., while the only phasins that can be subjected to this temperature without being denatured are those present in *Phaseolus communis* and related indigenous legumes, and to detect these from ricin toxicological methods must be employed, e. g., subcutaneous injections with rabbits.

"The paper concludes with elaborate directions as to the conduct of tests for the detection of ricin in feeding stuffs."—*Agricultural News*.

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### SOME FACTS ABOUT SUDAN GRASS.

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The growth of Sudan is a source of satisfaction to the farmers of southern Illinois. It is classed as a forage plant and for its kind ranks high, although comparatively little is known about it.

Sudan grass grows upright in long slender stems, reaching about 5 feet in height. The writer believes that wherever oats will grow Sudan grass will eventually take its place. It will grow on any kind of soil, but prefers a clay sandy soil. It is more difficult to care for than timothy on account of its very rank growth. One of its chief values as a feed for horses and cattle lies in the fact that it is very palatable. When fed to either they clean it up thoroughly, showing that they relish it, although it is an entirely new feed to them. This fact alone is always of interest to farmers and feeders.

On a one-half-acre plot the first cutting made at the rate of one and a half tons to the acre, and in just three weeks the second cutting made practically the same, and there will still be one more crop. Sudan grass is not well adapted for a wet season, such as Illinois has been having this year. On one place it almost drowned out, but this ground was exceptionally wet, and therefore the conditions encountered were not average. In dry years or in average years Sudan grass will produce twice as much as any of the common forages, such as oats, barley, millet and corn (the latter when used as a forage).

Taken as a whole, Sudan grass is destined to be one of the greatest hay and forage crops in this country, mainly because it has almost all the good qualities of the best plus greater production.—*The Breeder's Gazette*.

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### PUBLIC INCREASES USE OF NATIONAL FORESTS.

---

WASHINGTON, D. C.—There were 18,342 special-use permits in force on the national forests on June 30 last, according to figures just compiled by the U. S. Forest Service to show the varied uses to which the public is putting the government land involved. The list includes 59 apiaries, 2 brick yards, 31 canneries, 39 cemeteries, 9 churches, 1 cranberry marsh, 32 fish hatcheries, 1 golf links, 43 hotels, 1 astronomical observatory, 10 fox and rabbit ranches, 1085 residences, 74 resorts and club-

houses, 3 sanitariums, 500 sawmills, 163 schools, 9 slaughterhouses, 57 stores, 16 municipal watersheds, and 182 water power sites, with many other uses. Fees collected on 7895 of these permits contributed a total of \$175,840.40 to the general forest revenues, but 10,447 of the permits were issued without charge.

The permits cover more than 1,087,000 acres and 15,041 miles of right-of-way, granted for various purposes, these figures including 173,131 acres for municipal watersheds, 6572 miles for reservoirs, canals, pipe lines, and other irrigation and domestic supply works.

The steady growth of national forest business is shown in columns of yearly figures going back to the last century. Between 1891, when the first forests were established, and 1900 there were only six timber sales. The number in 1915 was 10,905. The number of free timber permits has risen from 283 in 1901 to 40,040 in 1915, and of grazing permits from 2317 in 1901 to 30,610 in 1915. The special use permits, which were only 298 up to the end of 1905, were increased by 5657 in 1915, making a total during the last 11 years of 42,369. Of these 18,342 are now in force.

#### POISONOUS BEANS.

A question of the poisonous nature of certain forms of Lima bean, dealt with recently in an article in the West Indian Bulletin, has been responsible for a note on the subject in The Field (London, July 17, 1915). In this it is stated that there is no great difference between the plants of scarlet runner or French beans and the Lima beans. The former are varieties of *Phaseolus vulgaris*, while the Lima beans are cultivated varieties of *P. lunatus*. They differ in the color of the flowers and *P. lunatus* contains fewer seeds than *P. vulgaris*. The seeds of the cultivated races of both species vary much in color. Those of the scarlet runner and French beans are supposed to be poisonous when mature, but as they are never eaten, except when they are quite young and innocuous, this does not matter. Lima beans, however, as pointed out in the West Indian Bulletin, are eaten when mature, and there are cases of fatal poisoning resulting from eating the dark-colored seeds. The subject of the poisonous nature of the Lima bean still continues to present problems requiring further investigation as is shown more and more by references to the subject which appear in the Bulletin of the Imperial Institute.—*Agricultural News*.

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**G. K. LARRISON,**  
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### DIVISION OF FORESTRY.

#### FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

C. S. JUDD,  
Superintendent of Forestry.

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### DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 2 HONOLULU, HAWAII.

EDW. M. EHRHORN,  
Superintendent of Entomology

# THE HAWAIIAN FORESTER AGRICULTURIST

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## OUR FRIENDS THE TREES.

*Address by C. S. JUDD, Superintendent of Forestry, at Arbor Day Exercises, Pohukaina School, Honolulu, Nov. 19, 1915.*

Do you know that the oldest living things in our world are trees? The giant sequoia trees of California, and their brothers, the redwoods, which we use here in these Islands for fence posts and water tanks, are the last survivors of a great family of trees which covered a large part of the western world in the past ages when strange and monstrous animals roamed the forest. When Solomon was building his temple about 2915 years ago, if he had only known it and had had the proper ships, he could have used for the rafters of his temple the giant sequoia of the Sierra Nevada mountains instead of the firs and cedars of Lebanon. Even then, these noble trees, which now tower up into the sky to more than half the height of Punchbowl, were over a thousand years old.

Aside from this interesting fact as to the age of trees, I want to point out why we regard the trees as our friends and why, for that reason, we celebrate this day by planting them.

What did you sleep in last night? A wooden house.

What did most of you sleep on last night? A wooden bed.

What did you eat your breakfast on this morning? A wooden table.

What did you sit in while you ate it? A wooden chair.

What was used in cooking your breakfast? Wood, undoubtedly, in most cases.

What was used in starting the fire in the stove? A wooden match.

What was the newspaper which you read this morning made of? And the books which you study in this school? Mostly of wood pulp.

So you see that we must call the trees our friends if we simply consider their usefulness in supplying us with wood for these articles, without which we could not very well get along.

And besides the value of trees in other countries for producing wood for our use here, let us see how useful are our own trees in these Islands. Take the algaroba or kiawe tree alone, which was first brought to these Islands about 87 years ago and

has multiplied and spread over many thousand acres, so that it is not only a benefit to ourselves, but also to the insects of the air and the beasts of the field. This tree not only supplies us with the wood which we need for cooking and the charcoal which heats our irons when our clothes are pressed, but produces the flowers which furnish pastures for the millions of bees which convert the nectar of the blossoms into honey which we eat on our bread and on our pancakes, and in the dry season when the grass in the pastures is brown and dead it drops the sweet yellow pods which are eagerly devoured by the cattle, horses, and pigs if they can get them before they are picked up by the little children, who take them to the mills, where they are ground up into meal to be fed to the animals later on. And how much more pleasant are parts of our islands on account of the shade which the algaroba trees produce.

When my father was a little boy and rode from Nuuanu to school at Punahou he had to ride around the makai side of Punchbowl and then across the large, open, wind-swept plains which are now crossed by Beretania street and which in those days had scarcely a tree or a house on them. One day his horse ran away with him and he let him run across this vast, treeless stretch of country, part of which is now Thomas Square, and out beyond until he came to a grassy place near a spring. Here he selected a soft spot and slid out from the saddle safely onto the ground.

How different these plains are today! They are not only thickly covered with streets and houses, but the innumerable trees that have been planted there have changed them from bare, wind-swept flats to a comfortable residence district, and when you look down upon them from Punchbowl they look like a huge forest and half of the houses can not be seen on account of the trees.

We plant trees in the city not only for the ornament which their foliage and flowers produce, and which please the eye, but also for the shade which their spreading branches afford and which protect us from the sun. When you wait on the corner for a street car on a hot day, how pleasant it is to seek the shade of a spreading monkey-pod or royal poinciana, and when a sudden shower comes up, isn't it a tree that you run to for shelter?

The value of trees for producing wood for a hundred different uses, for producing fuel, and shade and shelter, we unconsciously accept because they minister to our needs and physical comfort in a direct and tangible manner, but there is another way in which the trees when growing together in a community, which we call a forest, are equally as useful, only we do not realize it because their usefulness is exerted in an indirect manner. It is the effect of the trees in the forest on our water supply to which I refer.

When you drink your glass of clear water you should thank

the forests on the mountains not only for offering you refreshing water, but water whenever you are thirsty and want it. If there were no forests on the mountains back of Honolulu, when the rain fell it would rush down the slopes, into the valleys, and out to sea as a mass of dirty water, and in a few days it would all be done. But with our forests on the mountains it is different. The rain strikes the leaves and tree branches and then falls onto the ferns and bushes and finally onto the ground covered with fallen leaves and moss. All of this retards the run-off of the rain water and the litter on the ground acts as a sponge from which the water oozes out slowly. Water falling on a galvanized iron or shingle roof runs right off into the gutters, but if you covered that roof with moss or gunny sacks you would find that the water would run off much less at a time and would continue for a much longer period. So it is with a mountain-side covered with forest trees. The run-off from the rain is much slower and lasts for a longer time than if there were no forest cover.

Without the forests on our mountains, our water supply would be much less and of poorer quality, and there would be times when there wouldn't be any water at all. Without our forests, there would not be enough water for irrigating the sugar cane fields, and this industry would not be the mainstay of our islands; there would be little or no rice cultivation, and most of our taro patches would be dry. The freshets would dash down from the mountains a great mass of rocks and rubbish, you would seldom have any clear drinking water, and these islands would be a very unpleasant place in which to live.

Because the people of China long ago were careless in cutting down most of their forests, today in that country there are in the rainy season terrible floods which inundate and destroy the lands and kill many of the people.

The influence of forests on streams alone, besides preventing floods and drought, therefore, makes the raising of crops possible, and without crops we could not live.

As man is the most highly organized portion of the animal world, so is the forest the most highly organized portion of the vegetable world. The trees, of which the forest is composed, have functions similar to the workings of the human body. Their roots take water and mineral substances from the soil, which is pumped up to the leaves, which work it over with the aid of the sun and combine it with carbon from the carbonic acid gas in the air, into food which is sent to the living parts in the roots, trunk and crown to assist in the growth of the tree. This food is digested in the leaves of the tree just as food is digested in the human body.

So trees may be considered to be almost human. At least they are our friends, as I have told you already, because of what they do for us and supply us with, and they should therefore be treated by us as kind and useful friends. Don't throw sticks and stones

up into the trees or break off the branches, and when the young trees which you have planted droop in the hot sun, revive them with a pail of water.

Just give the trees a start and they will grow while you are doing other things, and as you get older they will come to be a real benefit and delight and a source of great enjoyment to you.

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### COMMISSION BUSINESS.

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#### *Extracts from Minutes of recent meetings of the Board of Agriculture and Forestry.*

SEPTEMBER 3, 1915.

The president presented a special report of the Superintendent of Forestry referring the application of C. M. Hudson for purchase of awa growing in the Hamakua Pali forest reserve, Hawaii. After a lengthy discussion questioning the advisability of establishing a precedent favoring the sale of government awa, and fully considering the relative benefits or disadvantages accruing to the homesteaders and the government, it was moved by Mr. von Holt, seconded by Mr. Rice, and unanimously carried that the matter be referred to the executive officer with full power to act, the board recommending publication for competitive bids and action in accordance with the suggestions in the report, which was accepted and ordered filed.

A special report of the Superintendent of Forestry re application of W. P. Jarrett to clear grass and plant trees on part of Ewa forest reserve at Aiea, next to his homestead, was presented by President Waterhouse. On motion of Mr. Dowsett, seconded by Mr. Rice, and unanimously carried, the recommendation in the report favoring the granting of permission was adopted and the report was ordered filed.

The president presented specifications drawn by the Superintendent of Forestry for constructing a hog proof fence around Olaa Park forest reserve, Section B. Mr. Judd stated that two sides of the reserve were bounded by government roads, one side by the property of Thomas Cook and one side by the property of the Bishop Estate, and exhibited a blue print showing location. After discussion it was moved by Mr. von Holt, seconded by Mr. Dowsett, and unanimously carried that the specifications be adopted and that the executive officer be instructed to approach the Bishop Estate and endeavor to obtain a subscription equivalent to the cost of constructing its share of ordinary fencing.

Mr. Judd stated that he had been devoting a great deal of time to preparing an inventory of property under control of the Board in accordance with new government forms. He asked the members of the Board for an expression of opinion as to the real



estate value of forest lands included in government forest reserves aside from water values. The matter was informally discussed, the sense of the final conclusion being that the real estate value was nominal.

SEPTEMBER 21, 1915.

The president presented the application, and Mr. Judd explained that Mr. Hudson desired to obtain immediately mature awa amounting to two tons from the Puna forest reserve to mix with young awa grown by the homesteaders to enable them to make sales. That Mr. Hudson would agree to pay a reasonable price for the awa and to other conditions to be made by the Board. After discussion it was moved by Mr. Dowsett, seconded by Mr. Rice, and unanimously carried that the executive officer be authorized to make an offer to Mr. Hudson of the sale of two tons of mature awa for a price of \$100, under conditions that the awa be taken within a period of sixty days and that for each mature awa removed 18 slips be planted, together with such other conditions as may seem best to the Board.

OCTOBER 13, 1915.

President Waterhouse announced that the executive officer has issued a commission to Herbert T. Osborn as field entomologist for the board for the collection of beneficial insects. Mr. Osborn had been sent for by Mr. Muir to join him immediately and it had been considered advantageous to commission him to do such work for the board. Upon motion of Commissioner Giffard, seconded by Mr. Rice, the commission was confirmed. Unanimously carried.

President Waterhouse stated that during the past week, while in Hilo, he had looked over the work of Dr. Elliot, the deputy territorial veterinarian for the Hilo district, and found everything very satisfactory; that Dr. Elliot had called his attention to the requirements under the rules of the Board of Health for dairy inspection and stated that it would be an advantage for him to hold a commission from the board as deputy territorial veterinarian for the entire island of Hawaii. After discussion and upon the understanding that there would be no additional expense to the board incurred on account of the increased responsibilities under the commission, it was moved by Mr. Giffard, seconded by Mr. von Holt and unanimously carried that the present commission of Dr. Elliot be cancelled and a new commission covering the entire district of the island of Hawaii be issued in its stead.

Upon request of President Waterhouse, Commissioner von Holt reported for the Committee on Forestry that during the past week he had visited the island of Kahoolawe in company

with the Superintendent of Forestry. He reported conditions greatly improved; that a fine growth of algaroba was spreading; that the number of sheep and goats was greatly reduced and that there were a number of more or less substantially constructed buildings and water cisterns. After a lengthy discussion it was moved by Mr. Dowsett, seconded by Mr. Rice, and unanimously carried that the board get rid of all livestock on the island of Kahoolawe; that the buildings be disposed of to the best advantage and that, with a view to restoring natural conditions, the island be allowed to remain idle for a number of years and that the executive officer formulate a plan to bring these things about.

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### INSPECTION OF PLANTS.

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By E. M. EHRHORN, *Superintendent of Entomology.*

The time is now at hand when many of our plant lovers will be ready to order plants, bulbs and seeds from various locations on the mainland as well as from Europe and other foreign countries. Many people have a dread to send away for plants or seeds for fear that the plant inspector or so-called "*Bugman*" will either kill them by fumigation or destroy them on arrival.

There are no restrictions on the importation of plants, seeds, fruits and vegetables from any part of the *United States*, but all such shipments are subject to the most rigid inspection for pests and diseases on arrival in this Territory. Many shipments arriving here from the various states of the mainland have certificates of inspection attached to the box or package stating that on a certain day Mr. B., inspector of the State of Idaho, inspected the nursery of ——— and found all trees and plants apparently free from pests. Certificates from eastern states generally read "free from San Jose scale" and other insects and diseases of a serious or injurious nature, but these certificates are usually issued when the nursery stock is still growing on the premises of the nursery, so that any root diseases or any root borers cannot be detected.

It has been the policy of the Superintendent of Entomology and Chief Plant Inspector of the Board of Agriculture and Forestry to disregard all certificates and only to pass all shipments of plants, bulbs, seeds, fruits and vegetables after his own inspection at the port of entry. In this way all pests which are located on the plants, etc., can be detected before the shipment is released.

All clean plants, that is, all plants free from any pests or diseases—and this applies to parts of plants as well as to other horticultural products including fruits—are passed immediately upon arrival.

All infested plants, those showing fungus diseases or insect pests, are either treated by fumigation, or are destroyed, all de-

pending on the infestation. If these plants are infested with pests already present in the Territory they are released after a thorough fumigation. This is done to prevent their being brought into some new locality where the pests might not exist. If the plants are infested with pests not known to exist in the Territory, they are destroyed and the party to whom they were consigned receives a certificate of inspection stating that the plants have been destroyed on account of being infested with a certain pest not known to exist in the Territory. This certificate can be used as a counterclaim against the nurseryman who sent in the infested plants. The same methods are used for shipments of fruits and vegetables.

Soil attached to the roots of plants is prohibited. Soil usually is a carrier of disease spores and eggs, larvae, pupae and adult insects. In ordering plants it is very important to inform the nurseryman or the florist of the soil regulation and see to it that he removes as much soil as possible from the roots and places moss around them before packing for shipment. Insist on the nurseryman sending good, clean stock and if a large order is given be sure to instruct the shipper to place plants in a large, well-ventilated box. This is absolutely necessary on account of the long voyage, which, if at all stormy, will prevent any plant shipment from receiving sufficient ventilation and the shipment will heat in transit and upon arrival many valuable specimens will be ruined. Many people send mail orders to the eastern states for plants, especially for roses, usually for small quantities, and they invariably arrive dried out and the flimsy box crushed in. The eastern shipper does not realize how far Honolulu is from where he has his nursery and he does not provide enough packing material to keep the plant moist for from 14 to 16 days. Nor does he use a strong enough shipping box for such a long journey where several transfers must be made before the final destination is reached. Anyone ordering from such places should insist upon the shipper using better than his usual methods so as to warrant the safe arrival of his goods.

Those who contemplate importing plants from countries outside of the United States have greater difficulties in so doing. Since the inauguration of the Federal Plant Quarantine Act by Congress, many rules and regulations pertaining to the shipment of plants from foreign countries into the United States have been made.

All plants, parts of plants, bulbs and seeds, excepting flower, vegetable and field seeds, cannot be sent into the United States or its territories by mail from any foreign country. This also includes packages by parcel post, and most plants from foreign countries would be sent by parcel post. All such shipments are immediately returned to the shipper and the consignee is notified of this action by the postmaster. The reason for the regulation is very apparent to those who come in daily contact with inspec-

tion work. It is next to impossible to prevent every package of plants or seeds from being passed by a postoffice without first having been inspected by the proper authority, as many packages are either not marked at all, or they are marked "merchandise" and in the great rush in the distribution of mail matter a number of packages will be overlooked. On account of this uncertainty some serious pest would be liable to be introduced into the country. Therefore, by prohibiting all plants and seeds by mail all this danger is avoided.

On August 20, 1912, Congress passed what is known as the Plant Quarantine Act. Under this act all importers of nursery stock and other plants and plant products are required to obtain a permit from the Federal Horticultural Board, U. S. Department of Agriculture, Washington, D. C., for importing all such plants from foreign countries. Application blanks can be had from the Superintendent of Entomology, Board of Agriculture and Forestry, Honolulu. By nursery stock is meant all field grown florist stock, trees, shrubs, vines, cuttings, grafts, scions, buds, fruit pits and other seeds of fruit and ornamental trees, except field, vegetable and flower seeds, herbaceous plants, bulbs and roots. After receiving a permit to import the desired plants the importer must order his plants from a country which maintains a government plant inspector who shall furnish a certificate of inspection in duplicate, one to be attached to the bill of lading, the other to the shipping case. Each package or case must be marked with the name of the grower of the plants, the shipper, the name of the consignee and the locality where grown, and must also have a list of the plants contained in the package attached to the outside of the same. From countries which do not maintain a government inspector only certain plants to be used for experimental purposes can be imported under a *special permit* granted for that purpose.

The following horticultural products are prohibited from entry into the United States or its territories: All five-leaved pine trees, on account of the white pine blister rust, from Europe and Asia; all citrus fruits, mangoes, sapotes, peaches, guavas and plums from Mexico on account of the Mexican fruitfly, and date palms from certain counties in California, Arizona and Texas on account of two serious scale insects. Cottonseed of all species and varieties and cottonseed hulls from any foreign locality and country excepting the Imperial Valley in the State of Lower California, Mexico, on account of the cotton boll weevil. Alligator pear seeds are prohibited from importation into the United States from Mexico and Central America on account of the avocado weevil. Sugar cane is prohibited from importation into the United States, excepting Hawaii and Porto Rico, on account of serious insect pests and fungus diseases existing in foreign countries. However, although allowing sugar cane to be imported into Hawaii and Porto Rico, these countries are prohibited from send-

ing sugar cane to the mainland of the United States, regardless of the use for which it may be intended.

All citrus nursery stocks, including trees, buds, scions and seeds from Europe, Asia, Africa, South America, North America, outside of the United States, and foreign Oceanic countries and islands, are prohibited from importation into the United States on account of a serious disease known as the citrus canker.

The following horticultural products cannot be exported from the Hawaiian Islands to the mainland of the United States: All fruits excepting pineapples and bananas, and these only when a permit of inspection is attached to the package or bunch. This is on account of the Mediterranean fruit fly. All cotton bolls, seeds and cotton seed hulls are prohibited on account of the pink cotton boll worm.

The following vegetables are also prohibited from being shipped: Chilipeppers, eggplant, squash, watermelons, tomatoes, cucumbers, pumpkins and stringbeans, on account of the melonfly.

By observing the above regulations and by insisting on getting the very best plants and seeds on the market, there should not be any trouble in importing these into the Hawaiian Islands.

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#### DIVISION OF ANIMAL INDUSTRY.

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Honolulu, Oct. 23, 1915.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I respectfully submit as follows my report for the Division of Animal Industry for the month of September, 1915:

Under date of July 15, 1915, I was authorized by the Board of Agriculture and Forestry to attend the annual meeting of the American Veterinary Medical Association, which this year was to be held at Oakland, California. During the 52 years of its existence this is but the second time that the said association has met west of the Rocky Mountains, and as it undoubtedly will be quite some time before it occurs again, the opportunity for meeting the leading members of the veterinary profession of the United States and Canada, without making an extensive and expensive voyage to the central or eastern part of the mainland was recognized by the Board, appropriating the sum of \$250.00 for traveling expenses. An account of my expenditure under this appropriation, approved by the auditor of the Territory, is herewith appended, and in submitting my report on observations and impressions received on my trip, I take the opportunity herewith to thank the members of the board for granting the same and to assure them that I have returned with new ideas, refreshed in body and mind and anxious to turn the same to account for the live stock industry of the Territory.

## GLANDERS.

During my absence from the Territory the work of the Division has devolved upon the assistant territorial veterinarian, who informs me that everything has gone smoothly, and as his report, herewith appended, will cover the work in detail there only remains to mention the fact that glanders has once more made its appearance in Honolulu. No apprehension need, however, be felt on that account as the outbreak was an isolated one, and was quickly brought under control by the destruction of the only two animals on or near the infected premises. But the case is of interest in that it adds to our knowledge regarding the length of time the infection of glanders may remain undetected in the system of apparently healthy animals, it being fully 5 years (1910) since the last case of glanders occurred in the stable in question, since which time the disease has been considered practically eradicated here. That such out-croppings of infection from old encapsulated and incrustated centers, in the lungs especially, in animals which were exposed to the infection years ago, but which at the time failed to react to the mallein test, might occur, was predicted in my annual report for 1913-1914, on page 183, and that this outbreak is one of this nature, and not due to extraneous infection, was fully proven by the post-mortem examination, which showed the presence of old calcareous nodules in the lungs of one of the two affected animals. I do, however, not wish to encroach on Dr. Case's report on this very interesting outbreak beyond reiterating that so long as horse owners will adhere to what they learned during the many years when glanders was an every-day occurrence here and will report immediately the appearance of any suspicious symptoms, especially the characteristic discharge from the nose and the enlarged glands under the jaw, there is little danger of the disease again getting a foothold here; but with old age comes the danger of recrudescence of these hidden centers of infection, and while we may still consider *the disease* as practically eradicated, *the infection* cannot be said to be completely or absolutely extinct until the last animal, at some time exposed to the invasion of virulent glanders bacilli, is dead.

The early report of suspicious cases must, therefore, be insisted on, and drivers, stable men and horse owners are herewith reminded that the territorial statutes as well as the regulations of this Board pertaining to the suppression and eradication of glanders and prohibiting the sale, exchange or exposure on public roads of infected or exposed animals are still in force and must be adhered to.

THE AMERICAN VETERINARY MEDICAL ASSOCIATION'S MEETING AT  
OAKLAND, CALIFORNIA.

*Foot and Mouth Disease and Hog Cholera.*

The live stock industry of the United States received last year one of the most severe blows in its existence.

The dreaded disease apthous fever, commonly called foot and mouth disease, made its appearance, practically in the center of the United States. To this day nothing definite is known as to how the infection was introduced. By surmise and deductions the live stock sanitarians have reached the conclusion that the disease was brought in with tanning materials from Japan. Two previous outbreaks, in 1902 and 1906, respectively, were traced to smallpox vaccine imported from abroad. In both of these cases, however, the disease was quickly recognized and its spread limited to a comparatively small number of states. Last year, however, nearly two months elapsed before the final diagnosis was made and the machinery of eradication set in motion. By that time the disease was scattered from the Atlantic to the Rocky Mountains and from Minnesota and Michigan to Arkansas and Texas—the Chicago Stock Yards even serving as a center of distribution. The situation was extremely serious and called for heroic measures such as had never before been dreamed of—leave alone the expenditure of millions of dollars. In less than a year, however, the disease was under complete control, only a few scattered localities remaining in quarantine, an achievement which did much to rehabilitate the standing of the veterinary profession and especially of the Federal Bureau of Animal Industry, which had to bear the brunt of “chimerical and vituperative opinions of the general and agricultural press” for failing to recognize the disease in time. But “although the sacrifices had been great and the cost enormous, (says the National Stockman and Farmer of Pittsburg, Pa.,) they were as a molehill to a mountain in comparison with the sacrifices and cost of policing and other measures which would have become necessary had the disease been allowed to become permanently established among our flocks and herds, imposing endless quarantines, condemnations and losses to stockmen, slaughterers and all concerned in the live stock industry.”

But the end was not yet. The veterinary meeting in Oakland was expected to be the greatest gathering of its kind ever brought together, some 900 or 1,000 members being expected. Instead of that about 150 put in an appearance and the greater majority of these came from the Pacific Coast States. The cause for this was a new outbreak of the same disease, not less than five states, New York, Michigan, Indiana, Illinois and Minnesota, reporting outbreaks of foot and mouth disease in widely scattered localities. This news came like a thunderbolt from a



clear sky. The live stock industry was just emerging from the worst crisis of its existence, and hopes of exhibiting at the large annual State fairs, which every fall gather the leading producers and representatives of every known breed of live stock in friendly competition, seemed almost sure of realization when the blow came.

By some as yet unexplained blunder hog cholera serum made from hogs harboring the foot and mouth infection reached the market and found its way to many localities which had hitherto escaped the disease or where it had already been eradicated and quarantine discontinued. The same severe restrictions on the movements of all cloven-hoofed animals, with shot gun quarantine of the infected farms, districts or counties, immediately came into force again, while the hopes of the exhibitors went aglimmering.

The early recognition of the cause of this second outbreak, and the fact that practically every bottle of the infected serum could be traced from the factory to its recipient, served however to greatly restrict the spread of the disease and assist the sanitary authorities in their efforts at suppression.

It may, therefore, be reasonably presumed that the secondary outbreak will soon be under complete control even though it will be too late for the Panama-Pacific Exposition's great live stock exhibit. This does not mean that no live stock will be shown there, but only that numbers of the leading breeders in the infected states will be barred from sending their show herds while many others, even from localities hundreds of miles from infected territory, will refrain from taking any chances of infection in transit or risk quarantine and destruction in case the disease should find its way through obscure and unknown channels to hitherto uninfected districts, as it has proven itself able to do.

The lesson to be learned from this last outbreak, though a costly one, may, however, prove an immensely valuable one. This is, as stated, not the first time that foot and mouth disease has been carried to this country, or scattered through it by means of biological products, though it is the first time this carrier was of local manufacture.

The inside facts of this story have, at the time of this writing, not been made public, beyond what has already been said, and while the Federal Bureau of Animal Industry is receiving the entire blame for the occurrence, it will undoubtedly be found in the end that cupidity coupled with ignorance and carelessness on the part of the so-called manufacturing chemists and their employees in using diseased stockyard hogs, presumably suffering from hog cholera, in the manufacture of serum, is at the bottom of it. Such animals reach the great live stock centers in large numbers, many farmers near a convenient market preferring to ship all their hogs at the first appearance of cholera among them,



and taking chances on a majority of them getting there alive and passing both ante- and post-mortem inspection, rather than going to the expense and trouble of sending for serum, or serum and virus, and thus get their farms or premises thoroughly infected and requiring the permanent use of serum. According to the virulence of the infection more or less of the hogs reach the market in a diseased condition and those which are condemned on ante-mortem inspection have (*or had*) little or no value, except for tankage. But with serum plants conveniently located such animals become of value for the manufacture of virus, being already infected and ready for "tapping." At the same time a sick animal is more susceptible to any kind of infection than a healthy one, while the symptoms of one disease may easily obscure or vitiate the symptoms of another. In this way some cholera infected hogs may have picked up a few attenuated but still surviving foot-and-mouth disease organisms, and, under cover of the cholera symptoms, have nursed them back to their original virulence. But before the characteristic symptoms of the secondary infection—the blisters and ulcers in the mouth and between the hoofs, the slavering and lameness—make their appearance, the hog is disposed of to a serum manufacturer, and the last drop of his blood is drawn and bottled, ready for distribution among unsuspecting hog raisers for the treatment and prevention of disease.

If the above surmise should prove correct it is obvious that the blame cannot be placed on the federal inspectors, whose duty consists in an annual or semi-annual inspection of the serum plants to see if the federal requirements as to sanitation and equipment are up to the standard. The actual and daily control of such establishments rest with the local health authorities, on whose officers devolves the inspection of all animals used in serum and virus production and the passing upon of the finished products before distribution.

But considering the immense increase in the manufacture and use of biological or serum-therapeutic products which has taken place during the past few years, and keeping in mind that these products deteriorate rapidly and therefore must be manufactured in the neighborhood where they are to be used, it will be seen that the federal authorities can only supervise such manufacture in the most cursory manner and must of necessity leave all details to the local authorities. Development along these lines has, however, been so rapid that it is a wonder that no greater calamity has not already occurred, especially when considering that we are dealing with poison of a most insidious nature, such as bottled hog cholera virus. Little wonder, therefore, that Dr. J. R. Mohler, assistant chief of the U. S. Bureau of Animal Industry, in reply to a direct question as to the advisability of the use of the hog cholera virus in this Territory, should express himself as absolutely opposed to it, unless the Territory was over-

run with the disease. Furthermore, he said, the shipment of infectious and contagious diseases in interstate trade is what this bureau was established to prevent and not to encourage or connive at, and it will undoubtedly not be long before the serum-simultaneous treatment will be completely abandoned or prohibited and the serum alone treatment established in its place.

The same view was expressed by every other live stock sanitarian of prominence to whom the local situation was explained—the fact that this Territory can be absolutely guarded against the introduction of infection from abroad being the most obvious reason for not introducing it in bottles, but to fight it with serum, sanitation and segregation. In fact, the past year has seen a strong turn of the tide among the veterinarians, practitioners as well as officials, against serum alone and sanitation. Whether the hog house has any actual part in the transmission of cholera from animal to animal has not as yet been established, but the fact remains that thorough sanitation, with disinfecting hog wallows and periodical dipping, seems in a number of cases to have kept certain hog farms free from the disease even though all the surrounding farms were infected. In the Breeder's Gazette of September 16, 1915, Dr. Nelson, State Veterinarian of Indiana, says: "The more I see of vaccination and its results in a general way the more I feel convinced that sanitation and not simultaneous vaccination is the solution of the hog cholera problem." And in another part of the same article he says: "I rode 91 miles one day last summer and that day did not visit any but sick herds, all of them having been vaccinated by the simultaneous method, being healthy when vaccinated, the loss ranging all the way from 12 to 94 per cent." Preceding this statement Dr. J. W. Connaway, chief of the Veterinary Department of the University of Missouri, gives the following advice: "I would, therefore, say to the young breeders and exhibitors, do not permit anyone to use that little virus syringe on your show hogs nor in your home herd. Do not permit anyone to bring onto your clean farm a little bottle labeled "Virus—Danger" for that little bottle *does* contain elements of danger which you do not want scattered over your farms. The inoculation of the contents of that bottle into your hogs is liable to make some of them sick, and some of them are liable to die, and the urine and dung from the sick hogs contain cholera germs which it is not well to have scattered over the premises. The scattering of this infection is planting seeds of disease for future trouble." And in conclusion Dr. Connaway adds: "The time is coming when there will be such a strong lineup of the agricultural press against the commercial use of hog cholera virus that its interstate traffic will be prohibited. It has been charged with carrying foot-and-mouth disease from one state to another. It has done worse than this, it has been carrying a disease that has cost the farmers of America vastly more than the foot-and-mouth disease."

So much for the indiscriminate use of hog cholera virus. At the Oakland meeting of the American Veterinary Medical Association a symposium of articles on hog cholera in all of its aspects concluded with a set of resolutions which were not even read by title, it being close to midnight, but which I had an opportunity to glance over. These resolutions admitted of the use of the virus treatment in heavily infected territory, and then in the hands only of veterinary officials or experienced sanitarians. Had these resolutions come up for discussion it is doubtful if even *that* much would have been conceded, there being present a number of state veterinarians absolutely opposed to the use of virus, whether in the hands of experts or otherwise. Dr. Connaway of Missouri, for instance, in the above quoted article says: "There is no veterinarian, no matter how expert he may be, who is always able to gauge the dosage of the serum and virus so as to prevent occasional disastrous results, if he honestly tries to give the breeder what he is paying for, namely, a life immunity to his show hogs."

It must therefore be admitted that there is a certain amount of risk connected with the use of the virus even under the most favorable conditions and that this risk at times becomes prohibitive. We also know that vaccination cholera occurs only when the relation between the injected virus and the preventive serum is not properly balanced, that the virus is too strong or the serum too weak, or that the virus contains micro-organisms and toxins against which the serum is ineffective or lacks the required antitoxins.

The point would therefore be, in districts where cholera prevails and where there might be some excuse for the application of the serum simultaneous vaccination to use virus only of the strength or virulence of the infection already on the premises, and avoid bringing in a stronger infection, as is frequently done with commercial virus. This idea was suggested to me by Professor Haring of the Veterinary Department of the University of California, who has seen it used successively on several large pig farms near Berkeley. On these farms where swill is being fed exclusively and where the swill is not boiled, there is always danger of cholera being introduced with pork scraps which in smoked or cured, but uncooked forms, is said to be able to transmit the disease. So when cholera breaks out a carefully selected pig showing typical symptoms of the disease is bled to death, the blood being gathered in sterilized vessels and defibrinated by shaking and straining. A post-mortem examination of the carcass is then made and if typical hog cholera symptoms are found the collected blood is used as virus in the serum-simultaneous treatment of all the susceptible hogs on the place. By this means no new infection is brought in, but the animals are protected against the infection already on the place, the use of the virus simply

insuring that all of the animals become infected and thus develop an active immunity under the protection of the serum.

The owner of a large pig ranch close to the Berkeley serum plant, who purchases all his serum there, absolutely refuses to use their virus, but prefers to develop his own virus as described. A week or ten days after birth all pigs are given a dose of protective serum alone; then at weaning time, when large numbers of pigs are to be actively immunized the owner brings to his place a sufficient number of young hogs, 100-125 lbs. apiece, from some part of the State where hog cholera is known not to exist, and which consequently are highly susceptible to the disease. These pigs are tested for tuberculosis and are then turned out on the premises, their temperatures being taken every day so as to know when they become infected and when is the best time to kill them to obtain the most effective virus. With this and the serum purchased from the Berkeley plant, all the weanlings are then treated, and, it is said, with highly satisfactory results. It should be mentioned that the owner in question raises ten to fifteen thousand pigs annually and feeds swill exclusively. But as he does not boil his swill there is a constant danger of reinfection, necessitating the continued use of serum. It was suggested that the disease could easily be stamped out and reinfection by means of the swill prevented through boiling, but it was held that the cost of boiling would equal the cost of treatment, and that there were so many other sources of infection from the cholera infected neighborhood, and which it would be almost impossible to guard against, the present method had been found the most economic. This undoubtedly is true, and will continue so until the disease has been brought under better control, but it is equally certain that the continued use of virus will postpone eradication almost indefinitely or until a breed of swine with natural inherited immunity has been evolved.

In the meantime I can see no serious objections to the Berkeley method being tried here by pig raisers who believe they have the infection on their premises, if proper precautions are taken, and conscientiously adhered to against the spread of the disease. Immune pigs are easily obtained here, and if such pigs develop cholera when exposed on the suspected premises their blood should furnish an ideal virus for just that place. But to introduce virus here from abroad I am even more strongly opposed to than before my visit to California. There is absolutely no call for it with the small amount of mild infection which may possibly still be here, as there will always be grave danger of serious losses from inoculation cholera and its subsequent escape to hitherto uninfected districts.

If the above suggestion is acted on by any of the local hog raisers, the following precautions, as laid down by federal and state authorities, should be adhered to and only on premises where thorough sanitation can be maintained and where the

escape of the infection can be effectively guarded against, should be allowed the practise of any method which carries with it the dissemination of pathogenic (disease producing) organisms.

#### CONTROLLING CARRIERS OF CHOLERA INFECTION.

By J. W. CONNAWAY, *University of Missouri.*

Breeder's Gazette, Sept. 30, 1915, pp. 548-550.

The most dangerous distributors of hog cholera infection with which the farmers have to deal are the sick and the exposed hogs. And if the farmers will devote greater attention to the control of these primary carriers and distributors of cholera infection, and will carry out the measures of control recommended herein, relating to dead hogs and infected feedlots, there will be but little danger from the distribution of cholera by the several secondary carriers that will be mentioned; for there will be but little infection to carry.

It is far more important to watch the hogs than the buzzards. The driving of sick hogs upon the highways to market is prohibited by law, but the law is sometimes broken by those who are ignorant of the provisions, and sometimes by those who know the requirements of the law, but ignore them, and have no regard for the rights of their neighbors. Sick hogs should never be removed from the farm, but should be closely quarantined until they have recovered or died. The infection and infected carcasses should be destroyed. The shipment of sick hogs to the market, even when hauled to the shipping station, spreads the disease, and increases the dangers at the local and large central stockyards, as well as being a source of danger to the farms lying along the railroad lines.

Healthy hogs that have been exposed to sick hogs in the same feeding pens may communicate the disease from contamination of their feet and bodies, and should not be driven over the roadways to market. They should always be hauled to the shipping station. If driven to market the farms along the highway are endangered. Streams, crossing the highway and passing through one or more farms, may become sufficiently contaminated from the feet and bodies of the hogs to start an outbreak. Only healthy hogs, from clean farms, should be driven to market, and it is probably a good practice to haul these, on account of the shrinking in weight from driving.

It is possible for cattle that have been fed in feedlots where hogs have been dying of cholera to carry the infection on their feet, when driven to market, and to spread the virus along the highway, whence it may find its way to adjacent farms. The feet of cattle may be easily disinfected by driving the animals through the dehorning chute, in the floor of which every farmer

should have a shallow vat, preferably of concrete. The vat should be the full width of the chute and 8 or 10 inches deep. (This vat is serviceable in the treatment of sore feet, in all farm animals, particularly cattle and sheep). A strong solution of copper sulphate (bluestone) or a 4 per cent. solution of the cresol compound solution should be used to clean and disinfect the feet of cattle that have been on cholera-infected grounds.

The danger of a recently purchased lot of feeding cattle carrying hog cholera germs on their feet, from an infected stockyards to the farm, should not be overlooked; and the proper disinfecting of the cattle's feet should be made to prevent the infection of the pastures and feedyards.

It is well known that dogs serve as carriers of cholera infection. It is therefore advisable, during outbreaks of cholera in the neighborhood, to keep all valuable dogs in quarantine, especially at night, to prevent them from roving about and visiting cholera-infected farms, where carcasses may have been left unburned. Worthless stray dogs should be destroyed.

Hog cholera infection is easily carried by chickens and turkeys from the roadway along which diseased hogs have been driven, or from an infected pen to clean pens, on other parts of the same farm. These fowls should be shut away from the hoglots, during outbreaks of hog cholera on the farm, or in the neighborhood. A few dollars spent in poultry netting will be less expensive than buying serum and cholera medicines, and will often save hundreds of thousands of dollars to the neighborhood. Pigeons are more dangerous as infection carriers, because of their habits of flying to neighboring farms and feeding with hogs that may be suffering from hog cholera. The pigeons should be destroyed or kept in confinement when cholera is in the neighborhood. Buzzards and crows should be dealt with by shotgun quarantine. Simultaneous and repeated attacks upon the roosting camps of these undesirable birds by farmers' clubs or anti-hog-cholera clubs will soon rid a neighborhood or county of these infection carriers. When the practice of burning all animal carcasses has become well established in a neighborhood, the buzzards will migrate to other regions where carrion food is available. They do not visit clean farms.

The traveling hog-doctor, with his "sure cure" and "preventive" for hog cholera, and all other ills to which swine are subject, should not be a welcome visitor, for he is liable to be an infection carrier. His business takes him to diseased herds; as a rule these business parasites are not careful thoroughly to disinfect their contaminated shoes and overalls after treating (?) a diseased herd. The itinerant "vaccinators" and local "farmer-agents" for serum companies are also undesirable visitors. They are more interested in their "commissions" and "fees" than in sanitation, and are more likely to spread cholera virus "with both hands and both feet" than they are to give relief from a threat-

ened danger from other sources. The local stockbuyer is a valuable gobetween for the farmer in marketing small lots of hogs, but he becomes a nuisance and menace if he forms the habit of seeking for bargains in diseased and badly exposed herds. He thus aids in maintaining infected pens at the local stockyards, and carries infection on his shoes to healthy herds and clean farms.

The owners of healthy herds should keep stock-buyers out of their hog-lots, if they have come from infected premises, and have not properly disinfected their shoes. Stockbuyers should join the farmers' anti-hog-cholera clubs, and do everything they can to aid in eradicating cholera by applying proper sanitary measures. It will serve their own business interests in the best possible manner.

Cholera infection may be carried to healthy herds and farms by teams and wagons. Threshing outfits that go from farm to farm should be careful to not drive through cholera-infected hog-lots, or in fact through healthy hoglots. Inquiry should be made as to the presence of cholera on the farms where threshing is done. Every precaution should be taken by every man on the force to avoid coming in contact with the infection, and to prevent the teams and wagons from doing so. When hogs are hauled to the local stockyards it is a wise precaution for the farmer not only to disinfect his shoes but also to disinfect the feet of the team, and the wheels of the wagon, before returning to the farm, especially if sick hogs have recently been unloaded in the local stockyards. Also disinfect the inside of the wagon-box, and the litter it may contain.

#### HOG RAISING IN HONOLULU AND VICINITY.

Immediately upon my return from San Francisco, an effort was made to ascertain the present status of the hog industry in and around Honolulu. If cholera was present an opportunity to test the Haring method on a small scale might be found, and if not it was desired to learn exactly to what extent hog raising had recuperated since the epidemic of 1911 when the Moiliili district was almost cleared of hogs. Dr. Case was therefore requested to make inquiries regarding hog raising at all farms and dairies where the tuberculin testing took him and special trips were made to those districts where hogs are always raised on a small scale. On Mr. Charles Bellina's farm at Kuliouou, one of the two places where cholera was prevalent last spring, everything was found highly satisfactory. There boiled swill is fed with alfalfa and no disease of a suspicious nature has appeared for several months. Good litters averaging from  $5\frac{1}{2}$  to 6 is the order, the pigs being treated to a small dose of serum a week or ten days after birth and to a full dose at the time of weaning. As no virus has been used it is obvious that the infection, unless carried by some of the survivors from the last outbreak, must by

this time have died a natural death or else become greatly attenuated. Mr. Bellina expressed himself as satisfied with the general outlook and it is indeed difficult to see how conditions could be improved on from a hygienic viewpoint. If extraneous infection is carefully guarded against and the swill heated to the boiling point there only remains the introduction of the more recent sanitary improvements, such as oil rubbing posts or disinfecting wallows or dipping tanks to make conditions ideal. Besides this Mr. Bellina has succeeded in improving the quality of his herd greatly by the use of good boars, and by judicious selection of sows for breeding it should not be long before uniformity in individual excellence is attained.

For downright enthusiasm, however, on the subject of hog raising one must visit the farm of Mr. Charles Martin, on the mauka side of Diamond Head. Mr. Martin all but sleeps with his hogs, and his success is so much more remarkable as he began a few years ago with practically nothing, a small stony lot and a few razor back sows—and cholera. He therefore had a hard row to hoe, and it was not until hog cholera serum became available that he began to forge ahead. Mr. Martin feeds swill exclusively, and he does *not* boil it, but he watches each sow and her litter and personally treats them with serum in the same way as mentioned above. In fact this method of injecting serum in the young pigs a week or ten days after birth, and again at weaning time, was originally introduced here by Mr. Martin, and to this he ascribes his astonishing success as a hog raiser. At the same time he has always been a strong believer in disinfectants, lime especially and some kind of coaltar creosote, besides establishing an effective shotgun quarantine against trespassing dogs, chickens and sanitary inspectors. But in the writer's opinion all of these measures have been but secondary auxiliaries to Mr. Martin's untiring energy and unfailing attendance upon his herd and its requirements at all times. A casual observer would not proclaim the farm a show place nor the herd a show herd, but Mr. Martin knows and appreciates a good mother sow and consequently he loses very few pigs. He gathers what green feed he can find, such as pig weed and honohono, and feeds cracked corn or middlings only in finishing his hogs for the butcher.

In the Moiliili district a great change has taken place since the epidemic of four years ago. About 25 piggeries with an aggregate of approximately 1200 hogs were visited. Scrupulous cleanliness and strong litters of young pigs were in evidence nearly everywhere. All swill is sorted and boiled with chopped green feed, pig weed, honohono and some panicum to which is added a varying amount of rice bran. No disease of any kind has occurred since the places were restocked from one to two years ago, and no serum is used. The animals, young and old, look well in spite of the frequently rather confining quarters. When asked for an opinion in regard to the use of serum and to what



the present promising conditions might be ascribed, one Oriental said: "Before too much pilau, this time wash wash, all time wash. Medicine too much money. Maybe by and by." An effort was made to impress these thrifty hog raisers with the necessity of reporting without delay any outbreak of disease, that we would be glad to help them and that we could help them now. Also they were reminded of what happened before when they succeeded in keeping the outbreak secret and every last hog in the district died. The difference between glanders and hog cholera was explained—a considerable number of horses and mules having been destroyed in the Moiliili district some years ago—and the fact that a hog with cholera could be treated and often saved, whereas a horse with glanders was incurable and had to be destroyed, was emphasized.

In the Kapahulu district things do not look quite so promising. There is in several cases a lack of care and attention, hogs, dogs and poultry all run together and as a rule only the boar is kept confined. As a consequence a number of pigs die. Serum is used in some places, more or less regularly, and in others not at all. This district illustrates better than any other the benefits of care and sanitation. Where these factors are in evidence the pigs are doing well, serum or no serum, but where they are lacking or entirely absent the litters are small and unthrifty and a number die. This does not mean that the serum is of no value, but emphasizes the value of hygiene and sanitation.

In regard to Mr. Pond's place, Dr. Case informs me that conditions are greatly improved and that no losses of any consequence have occurred recently. As intense swill feeding is practiced successfully both here and on the Mainland, and as Mr. Pond has had an opportunity to familiarize himself with the manner in which it is done on some of the largest hog establishments in California and other places, no doubt in the near future he will be able to demonstrate just how the most benefit can be obtained from this valuable but cheap hog feed. I should have liked very much to look into the subject myself but in the first place it is a question of animal husbandry to be dealt with by federal or territorial experiment stations, and in the second place travelling is very expensive in California and I was without funds for the purpose.

#### SORE HEAD, ROUP OR CHICKEN POX.

This disease familiar to every poultry raiser in the Territory, has for years been held responsible for the lack of interest taken in the egg and poultry business here. While it must be admitted that the disease, once it gains entrance into the yards and runs of a successful chicken farmer, is likely to cause him some loss and a great deal of inconvenience, if he makes an earnest effort at curing the affected birds and prevent the healthy ones from

clear sky. The live stock industry was just emerging from the worst crisis of its existence, and hopes of exhibiting at the large annual State fairs, which every fall gather the leading producers and representatives of every known breed of live stock in friendly competition, seemed almost sure of realization when the blow came.

By some as yet unexplained blunder hog cholera serum made from hogs harboring the foot and mouth infection reached the market and found its way to many localities which had hitherto escaped the disease or where it had already been eradicated and quarantine discontinued. The same severe restrictions on the movements of all cloven-hoofed animals, with shot gun quarantine of the infected farms, districts or counties, immediately came into force again, while the hopes of the exhibitors went aglimmering.

The early recognition of the cause of this second outbreak, and the fact that practically every bottle of the infected serum could be traced from the factory to its recipient, served however to greatly restrict the spread of the disease and assist the sanitary authorities in their efforts at suppression.

It may, therefore, be reasonably presumed that the secondary outbreak will soon be under complete control even though it will be too late for the Panama-Pacific Exposition's great live stock exhibit. This does not mean that no live stock will be shown there, but only that numbers of the leading breeders in the infected states will be barred from sending their show herds while many others, even from localities hundreds of miles from infected territory, will refrain from taking any chances of infection in transit or risk quarantine and destruction in case the disease should find its way through obscure and unknown channels to hitherto uninfected districts, as it has proven itself able to do.

The lesson to be learned from this last outbreak, though a costly one, may, however, prove an immensely valuable one. This is, as stated, not the first time that foot and mouth disease has been carried to this country, or scattered through it by means of biological products, though it is the first time this carrier was of local manufacture.

The inside facts of this story have, at the time of this writing, not been made public, beyond what has already been said, and while the Federal Bureau of Animal Industry is receiving the entire blame for the occurrence, it will undoubtedly be found in the end that cupidity coupled with ignorance and carelessness on the part of the so-called manufacturing chemists and their employees in using diseased stockyard hogs, presumably suffering from hog cholera, in the manufacture of serum, is at the bottom of it. Such animals reach the great live stock centers in large numbers, many farmers near a convenient market preferring to ship all their hogs at the first appearance of cholera among them,

and taking chances on a majority of them getting there alive and passing both ante- and post-mortem inspection, rather than going to the expense and trouble of sending for serum, or serum and virus, and thus get their farms or premises thoroughly infected and requiring the permanent use of serum. According to the virulence of the infection more or less of the hogs reach the market in a diseased condition and those which are condemned on ante-mortem inspection have (*or had*) little or no value, except for tankage. But with serum plants conveniently located such animals become of value for the manufacture of virus, being already infected and ready for "tapping." At the same time a sick animal is more susceptible to any kind of infection than a healthy one, while the symptoms of one disease may easily obscure or vitiate the symptoms of another. In this way some cholera infected hogs may have picked up a few attenuated but still surviving foot-and-mouth disease organisms, and, under cover of the cholera symptoms, have nursed them back to their original virulence. But before the characteristic symptoms of the secondary infection—the blisters and ulcers in the mouth and between the hoofs, the slavering and lameness—make their appearance, the hog is disposed of to a serum manufacturer, and the last drop of his blood is drawn and bottled, ready for distribution among unsuspecting hog raisers for the treatment and prevention of disease.

If the above surmise should prove correct it is obvious that the blame cannot be placed on the federal inspectors, whose duty consists in an annual or semi-annual inspection of the serum plants to see if the federal requirements as to sanitation and equipment are up to the standard. The actual and daily control of such establishments rest with the local health authorities, on whose officers devolves the inspection of all animals used in serum and virus production and the passing upon of the finished products before distribution.

But considering the immense increase in the manufacture and use of biological or serum-therapeutic products which has taken place during the past few years, and keeping in mind that these products deteriorate rapidly and therefore must be manufactured in the neighborhood where they are to be used, it will be seen that the federal authorities can only supervise such manufacture in the most cursory manner and must of necessity leave all details to the local authorities. Development along these lines has, however, been so rapid that it is a wonder that no greater calamity has not already occurred, especially when considering that we are dealing with poison of a most insidious nature, such as bottled hog cholera virus. Little wonder, therefore, that Dr. J. R. Mohler, assistant chief of the U. S. Bureau of Animal Industry, in reply to a direct question as to the advisability of the use of the hog cholera virus in this Territory, should express himself as absolutely opposed to it, unless the Territory was over-

Two horses on the place, one in good condition and apparently healthy, the other in very poor condition being practically skin and bones and very weak. This animal presented the following symptoms: An oily sticky, bilateral, nasal discharge; both sub-maxillary glands swollen and firmly adherent to the jaw-bones and an occasional cough. The animal walked with a stiffened gait, with head hanging low, but seemed to have a ravenous appetite.

Each horse received an intradermal injection of four drops of Malleins at 11:00 a. m. An examination at 4:00 p. m. showed swellings 2 inches in diameter at the point of inoculation in each case. On the horse showing clinical symptoms no sensitiveness was apparent, but the swelling on the other horse was quite painful.

A further examination was made the following day and there was no apparent reaction to the intradermal test in the clinical case the swelling being the same size and without heat or tenderness. In the other horse, however, a swelling appeared which was 4 inches in diameter and extremely painful. From its lower edge, two corded lymphatics extended for an inch toward the point of the shoulder.

At 11:00 a. m. each horse was given one drop of opthalmic malleins in the left eye and the clinical case ordered to the quarantine station where it was taken on a dray. It was in a moribund condition when it reached the station and fell from the dray as the corral was reached. At this time there was considerable muco-purulent discharge from the left eye—four and one-half hours after instillation of opthalmic malleins.

The horse was killed where it lay and a post-mortem examination revealed the following:

The nasal septum, turbinated bones and superior maxillary sinuses were covered with ulcers and purulent discharge. In places the nasal septum was nearly eaten through. The lungs showed four adhesions to the costal plura and all the lobes were filled with shot-like nodules. All the other organs of the body were apparently normal.

An examination of the remaining horse on the following day, 24 hours after instillation of opthalmic malleins, revealed a very pronounced reaction. The reaction to the intradermal test was considerably intensified, the swelling now being 6 inches in diameter, very painful and with three corded lymphatics extending to the point of the shoulder. The animal presented a very depressed appearance, standing in one place practically all the time with head hanging and caring little for food of any kind. The horse was removed to the quarantine station and directions were given for a complete and thorough disinfection of the premises.

A few days later this animal was killed and on post-mortem examination both lungs were found to contain shot-like glanders

nodules. The general character of these nodules indicated a comparatively recent infection. No other lesions were found in the body, the nasal septum and turbinated bones were perfectly clean and no scars were present.

This is not the first time that glanders has appeared on the Fernandez place. In November, 1910, a horse was taken from there to the quarantine station, tested and condemned, post-mortem examination verifying the test. This all goes to show the length of time an animal, especially the horse, will carry the disease germs in his system and still remain apparently healthy. Not until the vitality of the system has been lowered through the operation of one or more of the various causes such as lack of food, poor food, harsh treatment, over work, etc., will the invading organisms be able to overcome the defensive forces of the body, commence to multiply and to produce lesions of disease.

In the lungs of one of these two cases, the one showing clinical symptoms, calcareous and encapsulated nodules were found which, until further knowledge of the subject, must be regarded as primary lesions and indicating an infection of some duration and further indicative that this animal was the carrier of the infection. Still I am of the opinion that other things besides age inter into the calcification and encapsulation of diseased areas in both glanders and tuberculosis. These two conditions may not always indicate a primary lesion and it is very difficult, not to say impossible to point out the original point of infection as calcification, particularly, may take place more rapidly in one part of the body than in another and a secondary lesion assume all the indications of a primary focus.

### *Hog Cholera.*

Several inspections were made during the month, both at Pond's piggery, below Schofield Barracks, and at Bellina's piggery at Kuliouou. Considerable improvement has taken place in both places. No loss in either young or old hogs is occurring at Mr. Bellina's ranch, and it is safe to say that no further loss will take place as long as the present system of serum inoculation is adhered to. At Mr. Pond's farm little loss is occurring, and what there is cannot, at this time, be attributed directly to hog cholera. A certain percentage of loss among the young must be expected in the first litters following the injection of heavy sows with serum. The losses among the older hogs has been due to various digestive troubles consequent on forced swill feeding. Better management is working toward improvement, larger and stronger litters are being farrowed and all young pigs receive serum inoculations, both before and at the time of weaning. This is the most practical method to follow, it costs less and the pigs of this age are much easier to handle. Carried out

in this manner the great value of anti-hog cholera serum in the control of this disease can be fully demonstrated.

During the latter part of August and this past month, three shipments of hogs totaling 63 head have come from the Pond farm for the Honolulu market. Post-mortem examination at the slaughter house has not revealed the slightest evidence of cholera.

*Importations of Live Stock.*

S. S. Kentuckian, Seattle: 1 dog, Wells, Fargo Exp.

S. S. Ventura, San Francisco: 1 dog, William Knight.

S. S. Manoa, San Francisco: 8 crates poultry.

S. S. Matsonia, San Francisco: 2 dogs, Wells, Fargo Exp.; 1 dog, Mrs. F. Kunewa; 1 ct. rabbits, Mrs. H. Sanberg; 6 cts. poultry.

S. S. Niagara, Sydney: 1 dog, Dr. N. A. Neeley.

S. S. Lurline, San Francisco: 24 mules, Schuman Carriage Co.; 3 Holstein cows, 1 calf, S. I. Shaw; 1 Ayrshire bull, 2 Jersey cows, 2 Ayrshire cows, 6 Ayrshire calves, W. H. Rice, Kauai; 1 horse, Lt. G. H. Smith. For Kahului—19 brood mares, 1 registered percheron mare, 1 registered percheron stallion, 2 horses (standard bred), 4 horses (thoroughbred), Maui Agricultural Co.

S. S. China, Orient: 1 cat, Mr. Irwin.

S. S. Texas, Seattle: 16 horses, 13 mules, 6 sheep, 5 cows, A. L. Macpherson; 300 hogs, P. M. Pond; 140 hogs, C. Q. Yee Hop.

S. S. Wilhelmina, San Francisco: 11 cs. poultry; 1 dog, J. S. Wright; 2 dogs, E. G. Norita.

The black toy Pomeranian, which Mrs. J. D. Spreckels brought with her from San Francisco on July 16, and which has been in quarantine ever since, was suddenly taken sick on the morning of September 16 and died at noon. As I was at Mr. Templeton's dairy, Wahiawa, Dr. L. E. Case was called in attendance and a full report of the symptoms and post-mortem findings is herewith appended.

Respectfully submitted,

LEONARD N. CASE,  
Asst. Territorial Veterinarian.

Honolulu, October 29, 1915.

Dr. Leonard N. Case,  
Assistant Territorial Veterinarian.

Sir:—I beg to submit the following report:

On the 16th of September, 1915, I was called to the Animal Quarantine Station to attend a dog—Toy Pomeranian—the property of Mrs. J. D. Spreckels. Upon arrival I found the animal

dead. The following history of the case was given me by the attendant:

Subject seemed perfectly well up to evening of the 15th, at which time its appetite was noticed to be poor. The following morning he was a little more dull and the stool of a liquid sanguinous material.

Post-mortem examination showed the following conditions:

Organs of the pleural cavity normal in appearance and consistency. In the abdominal cavity the stomach, spleen and liver were normal; small intestines, caecum and a small portion of the large intestines were normal to all appearances; the remaining portions of the intestinal tract presented a dark red color and when opened were found to contain a large quantity of a glassy sanguinous material. The mucous membrane was greatly thickened and inflamed.

The right kidney was normal in size and consistency, the left was greatly atrophied, being about one-sixth its normal size.

Conclusion: Death was due to an acute hemorrhagic enteritis.

Respectfully submitted,

L. E. CASE,  
Veterinarian, Quar. Dept., U. S. A.

#### DIVISION OF ENTOMOLOGY.

Honolulu, Oct. 27, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work performed by the Division of Entomology for the month of September, 1915, as follows:

During the month 56 vessels arrived at the port of Honolulu, of which 20 carried vegetable matter and one vessel brought sand. Of these vessels six passed through the Panama Canal.

<i>Disposal</i>	<i>Lots</i>	<i>Parcels</i>
Passed free from pests.....	1,342	29,557
Fumigated . . . . .	11	131
Burned . . . . .	39	40
Returned . . . . .	1	1
Total inspected .....	1,393	29,729

Of these shipments 29,491 packages arrived as freight, 110 packages as mail matter and 128 packages as baggage of passengers and immigrants.

*Rice, Beans and Cereals.*

During the month 23,679 bags of rice, 2062 bags of beans and 20 bags of corn arrived from Oriental ports. Sixty-five bays of beans were found to be infected and after fumigation were allowed to enter the Territory.

*Pests Intercepted.*

Twenty-one packages of fruit and 9 packages of vegetables were confiscated from the baggage of passengers and immigrants from foreign countries and destroyed by burning.

A small package of seeds from Guam contained the following pests: A few Lepidopterous larvae, scale insects on nipa nuts, mango seeds containing *Nitidulid* beetles and some Anthribid beetles in other seeds. This shipment was thoroughly fumigated and the mango seeds were destroyed by burning.

Sixty-five bags of beans from Japan were infested with the bean moth (*Paralipsa modesta*). The shipment was thoroughly treated with carbon bisulphide before delivery.

A shipment of orchids from Manila was treated to fumigation on account of being infested with ants.

A package of acacia seeds from San Francisco was found weevily and was fumigated.

A shipment of four small plants in baggage from Japan was held until the soil around the roots was removed.

One package of betel nuts from Manila by mail was returned to shipper under the ruling of the Federal Horticultural Board.

## BENEFICIAL INSECTS.

The breeding and distribution of the various parasites of the fruitfly and the various dungflies has been continued on a small scale. During the month of September the following parasites were reared:

<i>Tetrastichus giffardii</i> .....	12,100
<i>Diachasma fullawayi</i> .....	789
<i>Diachasma tryoni</i> .....	379

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Total reared ..... 13,268

The usual amount of breeding of parasites of the various dungflies has continued and the following parasites, including those of the fruitflies were liberated in various sections:



Tetrastichus giffardii.....	9,000
Diachasma fullawayi.....	804
Diachasma tryoni.....	370
African spalangia.....	3,100
Philippine spalangia.....	3,100
African hornfly.....	500
Philippine pteromalid.....	500
Dirhinus giffardii.....	150
Galosus silvestrii.....	250

---

Total distributed ..... 17,774

Besides the above species, large numbers of *Opius humilis* were liberated. These are constantly reared from fruits used in the insectary and this shown that the species is well established here.

From the colonies of Mealy bug (*Leptomastix histrio* ?) brought from California last month, I was able to liberate 300 individuals. Another consignment of this parasite will shortly arrive from the California State Insectary.

Several lots of inoculated Japanese beetles have been distributed on this and other islands.

#### *Hilo Inspection.*

During the month of September Brother Matthias Newell reports the arrival of six steamers and one sailing vessel, of which four steamers brought vegetable matter consisting of 350 lots and 4495 packages, all of which was passed as being free from pests and disease.

#### *Inter Island Inspection.*

During the month 66 steamers plying between Honolulu and the other islands were attended to. The following shipments were passed:

Taro . . . . .	491	bags
Plants . . . . .	164	packages
Fruit . . . . .	28	"
Vegetables . . . . .	39	"

---

Total inspected ..... 722     "

The following packages were refused shipment on account of infestation or of having soil attached to the plants:

Plants . . . . .	14	packages
Fruit . . . . .	32	"
Vegetables . . . . .	1	"
<hr/>		
Total refused.....	47	"
<hr/>		

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

#### DIVISION OF FORESTRY.

Honolulu, Oct. 15, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit the following routine report for the Division of Forestry for the month of September, 1915:

#### *Forest Fires.*

Three grass fires occurred during the early part of the month in the region of Lihue on the eastern slope of the Waianae Mountains, Oahu, but only one of them did any damage, a small amount, to tree growth. The first occurred on September 5 and was extinguished the same day. The second, on September 6 and was put out the following day only after a fire line had been dug around it. The third, at which I was present, started at noon on September 8 and was extinguished within 40 minutes. The second fire burned over several acres on the higher slopes while the other two, which occurred only in grass and lantana, burned over a few acres. The dry conditions made it possible for the fires to burn very readily and unfortunately the originator of none of them was apprehended. They were all on private lands and were extinguished by laborers working in the adjacent pineapple fields of the Hawaii Preserving Company, who had strict orders promptly to leave their work and rush to every fire at the first sign of smoke. Foreman A. McAngus and Time-keeper Claude Bailey of the above company deserve great credit for the prompt and efficient manner in which they supervised the extinguishment of these fires. The copious rains which began on September 20 removed any further fire danger.

The continued dry conditions in North Kohala, Hawaii, and the occurrence of an extensive grass fire in that region, mentioned in my August report, made it seem advisable, on the recommendation of District Fire Warden S. F. Woods, to require permits for burning brush for a period. A notice to this effect was accordingly published in "The Kohala Midget" on September 22.

This requirement applies to the land in North Kohala from the northern boundary of the land of Kawaihae 1 to and including the land of Kaaauhuhu and runs until November 30, 1915.

### *Water Investigation.*

In company with the Superintendent of Hydrography, on September 14, I visited the mountain region in the vicinity of the Waiahole tunnel and made observations which will have some bearing on the possible effect on the native forest of the rapid withdrawal of underground waters. Memoranda were prepared on this subject by Mr. Larrison and myself for the President to transmit to the Governor, who is interested in the question.

### *Forest Reserve Inspection.*

On September 16, in company with the Forest Nurseryman, I inspected the 132 acres of private land in the Honolulu Watershed Forest Reserve in Manoa Valley which, under an agreement dated June 13, 1914, were turned over to the care and control of the Board for 5 years by Hon. Geo. R. Carter. The eucalyptus and other trees already planted are doing well and directions were given the caretaker concerning further planting.

### *Sales of Awa Root.*

Under authority granted by the Board on September 21, a sale of two tons of mature awa root in the Puna Forest Reserve, Hawaii, was made to Mr. C. M. Hudson of Hilo. Under a formal agreement approved on September 25, Mr. Hudson undertakes to plant 18 awa slips for every plant removed, to use every precaution to prevent forest fires and other damage to forest growth, and to remove the awa within 60 days. The payment of \$100 for the awa, which has been made, goes into the special fund which may be expended on forest reserves.

A notice calling for bids on an unestimated amount of awa root to be gathered in the Hamakua Pali Forest Reserve, Hawaii, has been published in the "Hawaii Herald." Bids will be received until October 16 and the awa will be allowed to be gathered only under conditions similar to those stated above. The sale of this awa at the present time is made with the Board's approval only so that available mature awa may be obtained to help out the Puna homesteaders in holding the present market until their planted awa is ready for harvesting and does not necessarily establish a policy of selling awa root generally from the forest reserves.

*Forest Fencing.*

Extensive work on the forest reserve boundary fence at Anahola, Kauai, began on September 27, when two laborers began to assist Forest Ranger Lovell in the digging of fence post holes.

Bids are being advertised for the construction of the fence around the koa grove in the Olaa Forest Park Reserve at 29 miles on the Volcano Road, Hawaii, and will be received at this office up to and including October 20.

*Coöperation With H. S. P. A.*

At the request of Hon. L. A. Thurston, chairman of the Committee on Forestry of the Hawaiian Sugar Planters' Association, I prepared and submitted to him material for the next annual meeting of the association on the relation of the sugar plantations to progress made during the last year in forest protection and extension and pointed out some salient needs and what yet remains to be done.

*Arbor Day.*

Attention is once more called to Arbor Day, which will be celebrated by tree planting some time about the middle of November, and for which our nurseries are getting ready a supply of suitable trees.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry.

## REPORT OF FOREST NURSEYMAN.

Honolulu, Oct. 15, 1915.

Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of September:

*Nursery.*

## Distribution of Plants.

	In seed boxes	In boxes transplanted	Pot grown	Total
Sold . . . . .	.....	600	72	672
Gratis . . . . .	.....	230	930	1160
	.....	830	1002	1832

*Collections.*

Government Realizations:	
Collections on account of plants sold amounted to.....\$	7.15
Preservation Forest Reserves:	
Sale of 2 tons of Awa Root in Puna Forest Reserve, Hawaii, under permit approved Sept. 25, 1915.....	100.00
Rent of premises at Half Way House, Tantalus, for July, August and September.....	30.00
For use of two acres of land Pauoa Valley, for July, August and September.....	5.00
For use of land and gathering ti leaf, on Kalawahine, Pauoa Valley, July, August and September.....	12.50
	<hr/> \$147.50 <hr/>

*Plantation Companies and Other Corporations.*

Under this heading 38,000 trees in seed boxes were distributed. From present indications, it would seem that a great deal of tree planting will be undertaken during the coming rainy season. Many inquiries are being received in regard to trees for wind breaks, firewood and other purposes.

*Collection and Distribution of Seed.*

From the Board of Trustees, Pukekura Park, New Plymouth, New Zealand, we received a letter of thanks for a collection of seed which we gave to Mr. Tribe, a member of the Park Trustees when he passed through Honolulu a short time ago. The letter also stated that they were sending us a collection of seed of their native flora.

A request for forest tree seed was received from The Director, Agricultural Station, I'Voloina, near Tamatave, Madagascar, from Prof. C. J. Hunn, University of Porto Rico, College of Agriculture, Mayaguez, a full list of sample packets. Seed has been forwarded as requested. At the nursery we have had several requests for seed samples from tourists and others passing through Honolulu. Those we gave sample packets with the understanding that they send us seed in return. The seed boys have been kept busy collecting seed in and around the city and on Tantalus.

*Makiki Station.*

At this station the greater part of the trees to be used during the coming planting season are kept. Caring for these, also transplanting, sterilizing and mixing soil, has constituted the principal work done during the month.

*Honolulu Water Shed Planting.*

The number of trees planted out during September amounted to 702 kukui. Other work done consisted of making holes and hoeing the young trees recently planted.

*Advice and Assistance.*

The writer has made calls and otherwise given advice and assistance at the request of people residing in the neighborhood of Honolulu, and on the other islands as follows:

Calls in and around the city.....	10
Advice by telephone .....	12
Advice to people calling at nursery.....	9
By letter to other islands.....	6
	<hr/> 37

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

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DIVISION OF HYDROGRAPHY.

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Honolulu, October 14, 1915.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography during September, 1915, is submitted:

*Special Investigations.*

The Governor of Hawaii has on several occasions called on this office for data and advice relative to water resources of the Territory. Special reports relative to water resources in the vicinity of Honolulu and Kapaa, Kauai, have been furnished. Copies of these reports are appended hereto.

*Weather Conditions.*

The dry weather conditions were broken by general rains beginning on Oahu and the most of Kauai about the middle of the month. Generous rains began on Maui, southern Hawaii and in the Lihue and Koloa districts of Kauai about the 20th, and all islands received rainfall above the average during the latter part of the month.

*Data Furnished Honolulu Water Supply Commission.*

At the request of the chairman of the commission a considerable amount of data have been furnished the commission. Arrangements have been made whereby data or information, which may be of value to this commission, will be forwarded to it as rapidly as these become available.

*1913-1915 Biennial Report.*

A biennial report for the biennial period ending June 30, 1915, which will include all data collected by this division during that period, is being prepared and will be available in blue print form by December 31, 1915. It is estimated that this report, which involves an immense amount of computations and office work, is now about 95 per cent. completed.

There has been a much greater demand during the past three months for hydrometric data than ever before, and the office force has been kept busy preparing data for special localities in order that these may be used in the near future.

Requests have been received for data relative to the streams and ditches of the districts of Laie, Punaluu, Heeia, Kaneohe, Kahanaiki, Kailua, Makawao, and all streams in the vicinity of Honolulu on Oahu; for the Waihee, Waiehu, Iao, and Waikapu districts on West Maui and all waters on East Maui; for the Anahola, Kapaa, North and South Wailua districts on Kauai; and for the Wailuku district on Hawaii.

*Flood Storage Near Laie, Oahu.*

The Laie Plantation is planning the storage of flood waters of the Koloa and Wailele streams. Continuous record stream gauging stations were established on these stream in July, 1914, by this office in coöperation with and at the expense of the plantation. Operation of these stations has uncovered the necessity of the construction of permanent concrete controls in order that the data obtained may be of more accuracy. The plantation is paying for the construction of these controls, which are being constructed by this office. This work has been started and will be completed during the present month.

It is believed that the information supplied by these measurement stations will enable Laie Plantation to supplant its present pumping plants by a gravity water supply system which will supply irrigation at a great saving of cost.

*New Construction.*

The construction of the three new continuous record stream measurement stations on the three main branches of the Waimea

River on Kauai is progressing favorably. It is estimated that these stations will be completed by October 31, 1915.

A reconnaissance of the upper valleys of the Honokawai, Olowalu and Ukumehame on Maui was made, and locations selected for the new continuous record stream measurement stations to be established on the Olowalu and Ukumehame streams.

### *Routine Maintenance and Operation Work.*

*Kauai.*—W. V. Hardy, accompanied by R. C. Rice of the Honolulu office, visited 32 stream and ditch measurement stations and made 25 measurements at regular stations and two miscellaneous measurements. One laborer was employed during the entire month improving trails.

*Oahu.*—Twenty-seven stream and ditch, and four rainfall measurement stations were visited. Sixteen stream and ditch measurements were made. The Waiahole Tunnel outflow was measured, and was found to be decreasing rapidly at both portals. The flow from the north portal on September 6 was 17.7 million gallons daily and on September 30 about 16.7 million gallons daily. On October 2, the flow from the south portal was 9.6 million gallons daily. The total flow from both portals on September 30 was about 26 million gallons daily.

*Maui.*—Only routine work was done. Twenty-nine stream and ditch, and three rainfall measurement stations were visited. Eight stream measurements were made.

*Molokai and Hawaii.*—Only rainfall measurements were made by coöperative observers.

### *October Plans.*

*Kauai.*—New measurement stations on Waimea River will be completed. Four stream and ditch measurement stations on the upper Hanapepe River (privately-owned) will be abandoned. Trail clearing will be continued.

*Oahu.*—A large amount of maintenance work will be done, such as repairing weirs, foot bridges, etc. New concrete controls will be completed on the Koloa, Waialele, Kahawainui, East and Middle Malaekahana near Laie and Kahuku. An investigation of water resources between Diamond Head and Makapuu Point for the military authorities will be started.

*Maui.*—Only routine maintenance and operation work will be done.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.



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# Board of Agriculture and Forestry

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A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

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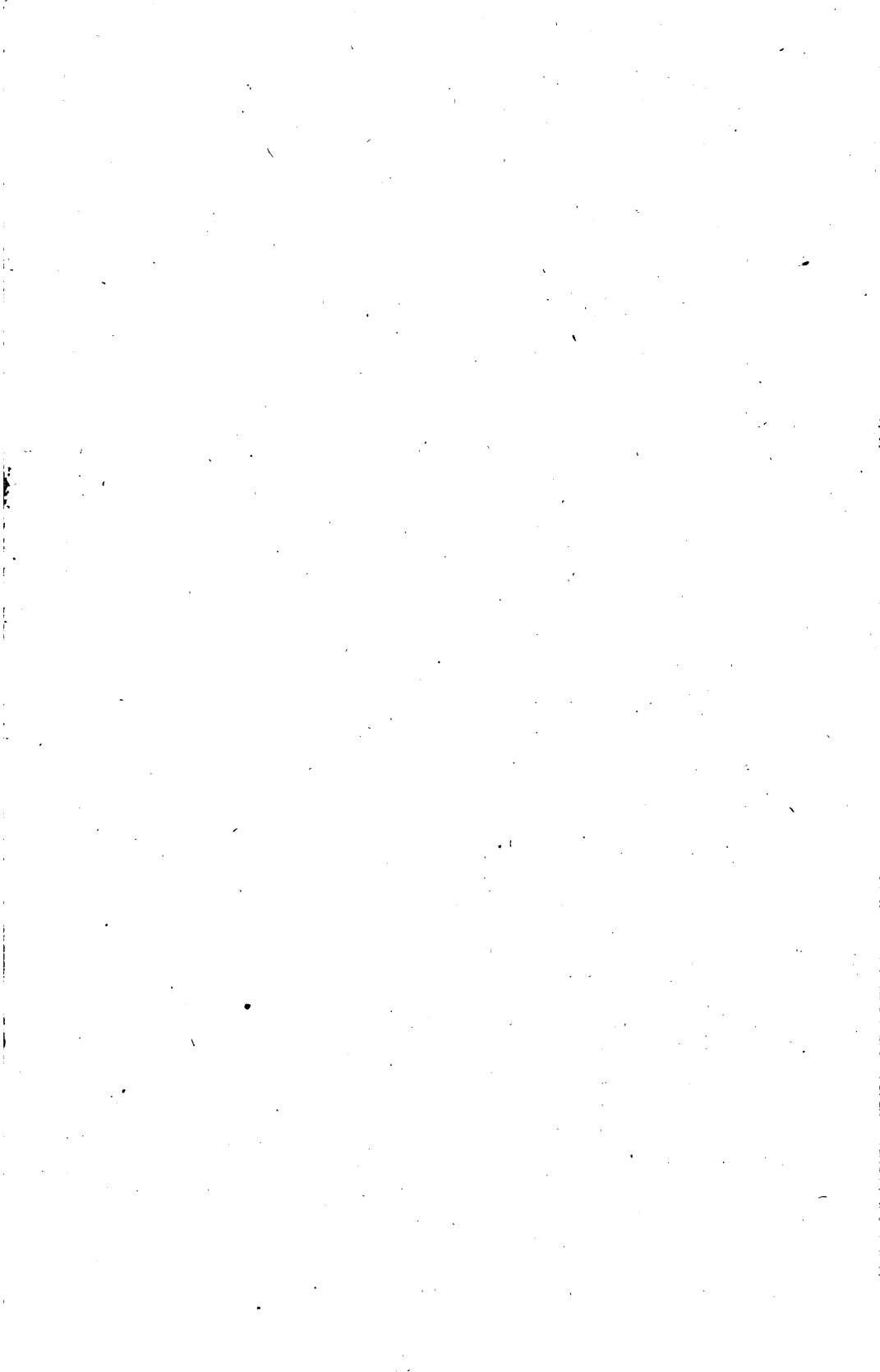
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Rooms 17-22 Kapiolani Bldg. Tel. No. 3662.

The Division of Hydrography has on hand free publications relative to the water resources of the Hawaiian Islands. These publications furnish detailed data as to daily, monthly, mean, maximum, and minimum run-off of streams and ditches, and also cuts and maps pertaining to the different islands. These publications will be mailed free of charge on request.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

G. K. LARRISON,  
Superintendent of Hydrography.









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